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Psychometric Evaluation of the Navy-wide Personnel Survey

Carla M. Bann, Ph.D
RTI International

Kimberly P. Whittam, Ph.D.
Navy Personnel Research, Studies, and Technology

Kortnee Barnett-Walker, M.S.
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Kortnee Barnett-Walker, M.S.
RTI International

Reviewed and Approved by
Paul Rosenfeld, Ph.D.
Institute for Organizational Assessment

Released by
David L. Alderton, Ph.D.
Director

Navy Personnel Research, Studies, and Technology (NPRST/PERS-1)
Bureau of Naval Personnel
5720 Integrity Drive
Millington, TN 38055-1400
www.nprst.navy.mil

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RTI International
P. O. Box 12194
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14. ABSTRACT

The 2005 Navy-wide Personnel Survey (NPS) was administered to active duty officer and enlisted Sailors between March and June 2005. This report presents the results of the psychometric analyses of the survey data, including item and scale reliability. In addition, two new indices were developed: the Navy Climate Index (NCI) and Re-enlistment/Continuation Intention Index.

15. SUBJECT TERMS

Navy-wide Personnel Survey, NPS, climate, re-enlistment, retention, psychometrics

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Foreword

The Navy-wide Personnel Survey (NPS) is a major product of the Navy-Wide Survey Program (NWSP, formerly known as the Navy Personnel Survey System (NPSS)). Administered regularly by Navy Personnel Research, Studies, and Technology (NPRST) of the Bureau of Naval Personnel (BUPERS), the NPS focuses on quality of work-life topics. This information provides valuable metrics to senior leadership and program managers that assist in the evaluation of Navy quality of work life, current personnel policies, and programs. NPS is also one of the cornerstones (along with the Quality of Life survey) of the Navy's survey strategy. The survey strategy consists of two omnibus, multi-topic Navy-wide surveys to provide broad work and personal life satisfaction with trends over time. This information is augmented by quick topic specific surveys (Navy Quick Polls), focus groups, location specific assessments (Rapid Polls), and other methodologically specific studies. One of the important functions of NPS is that its items and Navy-wide normative data serve as the standard validity indicators for virtually all other Navy personnel surveys.

The 2005 NPS was conducted under the sponsorship of the Chief of Naval Personnel (CNP/N1) within the NWSP funding line. Data collection began in March 2005 and concluded in June 2005. A briefing was prepared in July 2005 and the results were presented to the Chief of Naval Personnel and the Master Chief Petty Officer of the Navy in September 2005.

Because of the pivotal role NPS has in other surveys, the data were analyzed in detail using advanced statistical techniques to evaluate the psychometric properties of the survey. Existing items and scales were evaluated, and, when warranted, revised scales were developed and further evaluated. In addition, initial work was conducted to develop a Navy Climate Index and a Reenlistment Intention Index. The results of these analyses are presented in this report.

Any questions regarding this report should be directed to the NPS Project Director, Dr. Kimberly Whittam, kimberly.whittam@navy.mil, (901) 874-2321 or DSN 882-2321.

DAVID L. ALDERTON, Ph.D.
Director

Executive Summary

One of the most comprehensive sources of attitude and opinion data among Navy personnel is the Navy-wide Personnel Survey (NPS). In the current study, the psychometric properties of existing items and scales on the NPS were evaluated, using methods such as Item Response Theory (Lord, 1980) and confirmatory factor analysis. The majority of items and scales held up well. Revisions were recommended to 6 of the 18 scales evaluated.

Additionally, initial analysis was begun to develop an overall measure of Navy climate. The Navy Climate Index (NCI) included seven scales from the NPS: (1) workplace climate, (2) organizational commitment, (3) morale, (4) job security, (5) communication, (6) fairness, and (7) Navy image. The index demonstrated validity based on a second-order confirmatory factor analysis and comparisons of mean scores by respondents' ratings of job satisfaction, climate in the Navy and climate in their current command. The index was also significantly related to intentions to re-enlist and to have a full career (20 years or more) in the Navy.

Finally, an index for predicting intentions to re-enlist or continue at the next decision point was also developed. This index was developed using backwards stepwise logistic regression to identify items and demographic and job characteristics which predicted re-enlistment and continuation intentions. Separate models were developed for Sailors in their first term of service and those in later terms of service. The index had high sensitivity and specificity for predicting retention intentions among Sailors in their first term of service. However, these values were somewhat lower for Sailors in later terms of service.

Future areas of research are also discussed. These recommendations include exploring the suitability of utilizing individual items as proxies for longer scales. In some circumstances, shorter scales may provide benefits, such as lower respondent burden and/or reduced time and costs for survey administration, which could outweigh a minimal loss in reliability or validity. Additionally, the data from NPS 2005 has become part of an ongoing NPRST research protocol that follows Sailors through time to see whether future behavior is predicted by attitudes and stated career intentions.

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Background

The U.S. Navy faces a number of challenges pertaining to the management of the personnel needs of its officers and enlisted personnel. To better address these challenges, Navy leadership needs accurate metrics that capture the quality of Navy work life and how it impacts Sailors, their families, and the Navy organization as a whole. In an era characterized by changing work demands, unpredictable missions, and possible reductions in total end-strength, Navy leadership is interested in measures of the overall perception of the Navy experience. This perception includes workplace factors such as job satisfaction, job security, compensation, quality of life, leadership, organizational commitment, fairness, and communication. The development of a valid and reliable measure of Navy Climate and the evaluation of its relationship to Sailor outcomes (i.e., retention intent, retention behavior) would provide leadership with insights regarding perceptions of Navy life as a whole.

A comprehensive source of data for developing the Index is the Navy-wide Personnel Survey (NPS), a long-standing survey conducted by researchers at Navy Personnel Research, Studies, and Technology (NPRST). The NPS was first administered in 1990 at the request of the Chief of Naval Personnel. The NPS was administered annually from 1990 to 1998 and at longer intervals thereafter with surveys being fielded in 2000, 2003, and most recently in 2005. Current plans are to re-administer the NPS annually on the Internet.

The objective of the NPS is to measure Sailor satisfaction with Quality of Work Life (QWL) indicators such as job satisfaction, organizational commitment, leadership satisfaction, and workplace climate and their effects on outcome measures such as retention intention. The NPS also captures other demographic and personnel data that may not be accurately captured in other Navy databases (e.g., TEMPO, career plans, financial status, marital status, numbers of dependents) and satisfaction with other manpower and personnel processes (e.g., job assignments personnel distribution (detailing), performance evaluations and promotions/advancement).

NPRST researchers have used NPS data to examine a wide range of workplace factors with recent efforts focusing on modeling workplace factors that comprise QWL (Janega & Whittam, 2004) the effect of operational TEMPO on retention plans (Olmsted & Whittam, 2004), and linking retention intentions on the NPS to actual subsequent retention behaviors. The NPS is a rich source of Sailor attitude and perceptual data to test theoretical models, explore the measurement of new concepts and constructs, and for the present study's goals.

In the current study, the psychometric properties of existing items and scales on the 2005 NPS were evaluated using techniques, such as item response theory and confirmatory factor analysis. Based on these analyses, revisions to the existing items and scales were recommended. Additionally, a Navy Climate index was developed and the relationship between index scores and survey respondents' ratings of overall climate, job satisfaction, and morale was explored. Finally, a short index using items from the NPS to predict re-enlistment/continuation intentions was developed.

Existing Items and Scales

This chapter provides an overview of the analyses of 18 existing scales consisting of 101 items from the 2005 NPS. The 2005 NPS was administered on the Internet between March 20 and June 20, 2005 to a stratified sample of 16,372 active duty Sailors. There were a total of 3,610 usable surveys which, after adjusting for incomplete surveys and non-contacts, resulted in an overall response rate of 26 percent (unweighted) and 37 percent (weighted to the population). To evaluate the psychometric properties of the scales, descriptive statistics for each item were computed, including the percentage of respondents who indicated they agreed or disagreed with each statement. Items with very low or very high levels of agreement may not be informative and could potentially be removed from future administrations of the survey.

Next, the dimensionality of the scales was explored. One-factor confirmatory factor analyses were conducted to test whether the items grouped into factors corresponding to the scales. The model fit was assessed using several fit indices, including the Comparative Fit Index (CFI), Tucker-Lewis Fit Index (TLI), and the Standardized Root Mean Square Residual (SRMR). Ideally, a model should have a CFI and TLI ≥ 0.90 and an SRMR of 0.08 or lower for an acceptable fit. For scales with three items or fewer, exploratory, rather than confirmatory, factor analyses were conducted due to lack of model identification.

Item Response Theory (IRT) analyses were then conducted to further explore the properties of the items. Because all of the items contained five ordered response options, item parameter estimates were computed using Samejima's graded response model (Samejima, 1969). In the graded model, two types of parameters are estimated for each item. The first parameter is the slope or *a* parameter which quantifies how related the item is to the construct being measured by the scale. In addition to the slope, a set of threshold or *b* parameters are estimated. The thresholds locate each response option along the continuum of the underlying construct. In other words, the thresholds for items on the Organizational Commitment scale would indicate the approximate level of organizational commitment individuals would need to have before they would endorse the corresponding response option. The number of thresholds estimated is equal to the number of response options minus one. Therefore, four threshold parameters are estimated for items on the NPS that contain five response options (e.g., strongly agree to strongly disagree).

In addition to computing the IRT item parameters, item characteristic curves (ICC) were plotted for each item. The ICCs present the probability a response option will be endorsed according to level of the underlying construct. The steepness of the curves is determined by the item slope and the spread of the curves for the response options are determined by the thresholds. Ideally, the curve for each response option should have a high peak and none of the curves should be completely overlapped by the others.

For each item, responses of "don't know" or "not applicable" were recoded as missing. Scale scores were computed as the average of responses to the items on the scale. Before computing the scale scores, items were reverse coded so that higher scale scores would indicate more of the construct being measured (e.g., higher morale, more job security).

The confirmatory factor analyses were computed using the MPlus software program (Muthén & Muthén, 2003) while the IRT analyses were computed using the Multilog for Windows software program (Scientific Software International, 2003). The remaining analyses were conducted using SAS version 9. Because methods are not available to incorporate analysis weights into the IRT analyses, all analyses were conducted on the unweighted 2005 NPS data to ensure the results are comparable. Below is a brief summary of the psychometric properties of each of the 18 scales.

Availability of Resources

The Availability of Resources scale includes four items on the adequacy of personnel, tools, spare parts, and Navy support services. Table 1 presents the percentage of survey respondents who indicated that they agreed or strongly agreed with each of the Availability of Resources items. Most of the items had high levels of agreement; however, agreement with item Q8D was noticeably lower than the others with agreement of 54 percent. The confirmatory factor analysis suggested that all four items formed a single underlying factor.

Table 1 displays the item parameters from the graded response IRT model. Ideally, items should have slopes of 1 or higher to demonstrate good discrimination. As shown in the table, all four items on the scales had high slopes, indicating that they can effectively discriminate between respondents with high vs. low perceptions of availability of resources.

The threshold parameters provide information about the performance of the response options for each item. For example, the last thresholds for items Q8C and Q8D are higher than those for items Q8A and Q8B, suggesting that a higher level of satisfaction with availability of resources is required before endorsing "strongly agree" for these items.

The item characteristic curves for the Availability of Resources items are shown in Figures 1–4. Reviewing the curves suggests that all four items have good discrimination and the curves for the response options are generally spread across the horizontal access representing the underlying construct (theta). In particular, the curves for item Q8B are especially steep, suggesting very good discrimination.

Table 1
Availability of Resources Scale

Item #	Description	% Agree / Strongly Agree	Factor Loading	IRT Parameters				
				a	b1	b2	b3	b4
Q8A	Adequate qualified personnel	76.1	0.70	1.96	-2.45	-1.45	-0.94	0.84
Q8B	Adequate tools	70.7	0.79	4.58	-1.89	-1.05	-0.59	0.90
Q8C	Adequate spare parts and/or supplies	54.4	0.64	2.28	-1.87	-0.90	-0.18	1.43
Q8D	Adequate Navy support services	70.5	0.50	1.25	-2.91	-1.76	-0.91	1.43

Notes:
Analyses are unweighted.
Confirmatory factor model fit indices: CFI = 0.98, TLI = 0.90, SRMR = 0.02.
Correlated errors are permitted between items Q8B and Q8C.

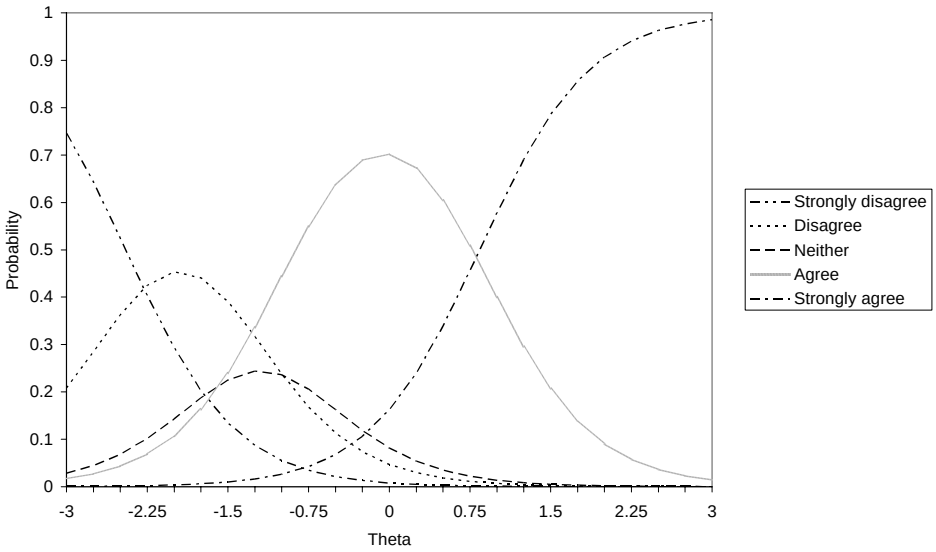

Figure 1. Item characteristic curves for items on Availability of Resources Scale (Q8A: Adequate qualified personnel).

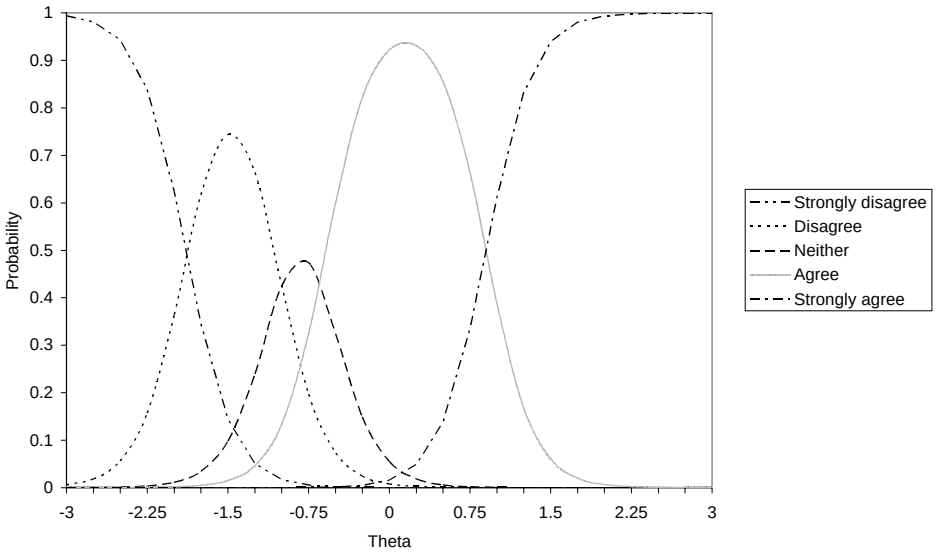

Figure 2. Item characteristic curves for items on Availability of Resources Scale (Q8B: Adequate tools).

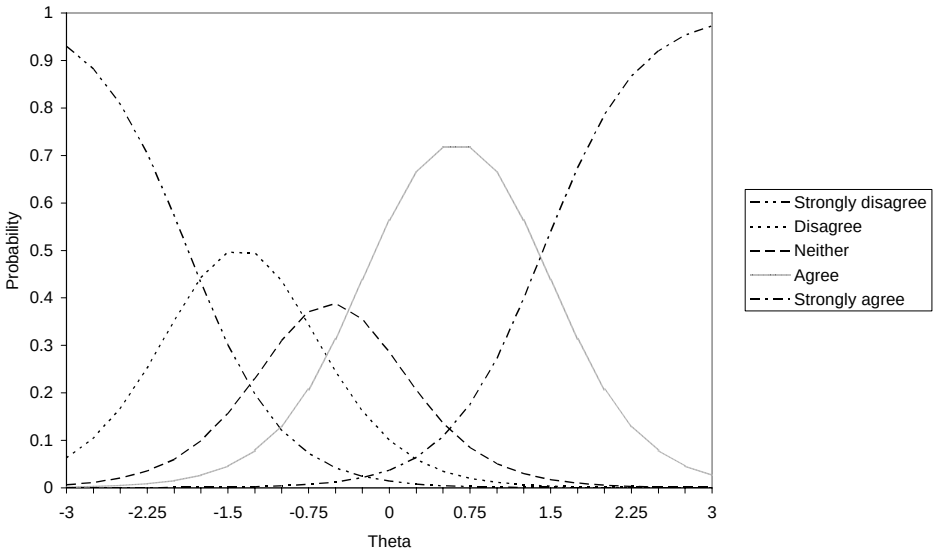

Figure 3. Item characteristic curves for items on Availability of Resources Scale (Q8C: Adequate spare parts and/or supplies).

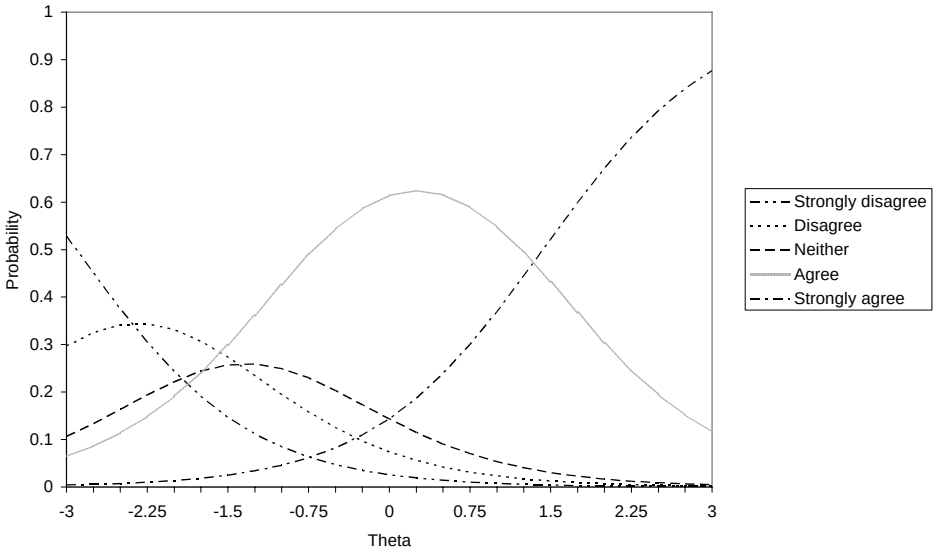

Figure 4. Item characteristic curves for items on Availability of Resources Scale (Q8D: Adequate Navy support services).

Morale

The item-level statistics for the Morale scale are shown in Table 2. The percentage of respondents indicating that an item had a positive or strong positive effect on morale ranged from a low of 27 percent for item Q10O (TEMPO) to a high of 72 percent for item Q10F (co-workers and shipmates). The factor loadings for all items were high with values of 0.50 and higher and all items had IRT slopes of 1 or more. The ICCs shown in Figures 5–18 suggest fairly good discrimination for the items. For some items (e.g., Q10A, Q10F, Q10G), the curve for the middle response, no effect, was entirely engulfed by the other response options, suggesting that it may not be informative. However, given that this response option was informative for some items (e.g., Q10C, Q10D, and Q10E); it is suggested that they be retained for consistency across the scale.

Table 2
Morale Scale

Item #	Description	% Positive/ Strong Positive Effect	Factor Loading	IRT Parameters				
				a	b1	b2	b3	b4
Q10A	Advancement/promotion opportunities	55.8	0.50	1.20	-2.90	-1.22	-0.25	2.16
Q10B	Performance evaluation system	51.9	0.58	1.50	-2.59	-1.11	-0.06	2.24
Q10C	Supply of spare parts/supplies	30.7	0.55	1.27	-2.69	-0.93	0.82	3.14
Q10D	Quality of Navy training programs	54.0	0.62	1.64	-2.65	-1.41	-0.12	2.21
Q10E	Quality of education programs	65.5	0.57	1.48	-2.97	-1.84	-0.54	1.72
Q10F	Co-workers/shipmates	71.5	0.58	1.47	-2.88	-1.51	-0.79	1.35
Q10G	Immediate supervisor	67.9	0.56	1.57	-2.36	-1.34	-0.62	1.26
Q10H	Command leadership	60.7	0.66	1.89	-1.83	-0.91	-0.32	1.21
Q10I	Pace of work	47.1	0.68	2.34	-1.68	-0.65	0.08	1.87
Q10J	Workload	41.0	0.69	2.27	-1.50	-0.50	0.26	1.92
Q10K	Unit/workgroup manning	39.3	0.66	1.87	-1.66	-0.53	0.33	2.21
Q10L	Pay/bonuses/other compensation	49.7	0.52	1.16	-2.74	-1.59	0.04	2.29
Q10M	Amount of time off	55.8	0.67	1.77	-1.69	-0.81	-0.17	1.50
Q10N	Navy support services	54.0	0.50	1.17	-2.95	-1.72	-0.16	2.36
Q10O	TEMPO	27.0	0.57	1.30	-1.87	-0.72	0.97	2.57
Q10P	Performance of crew, work team on exercises	62.4	0.57	1.43	-3.22	-2.04	-0.42	1.88

Notes:
Analyses are unweighted.
Confirmatory factor model fit indices: CFI = 0.92, TLI = 0.90, SRMR = 0.05.
Correlated errors permitted between the following sets of items: Q10 and Q10B; Q10D and Q10E; Q10F, Q10G, and Q10H; and Q10I and Q10J.

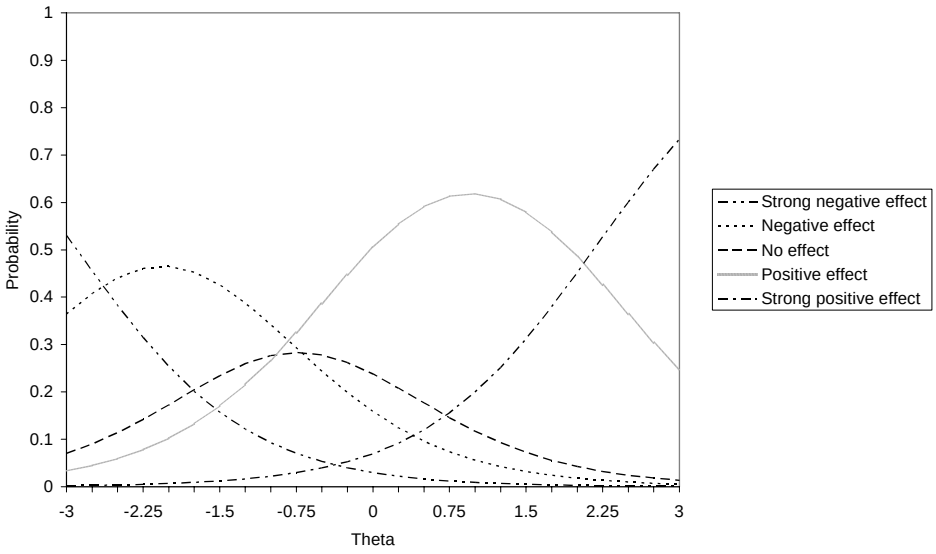

Figure 5. Item characteristic curves for items on Morale Scale (Q10A: Advancement/Promotion opportunities).

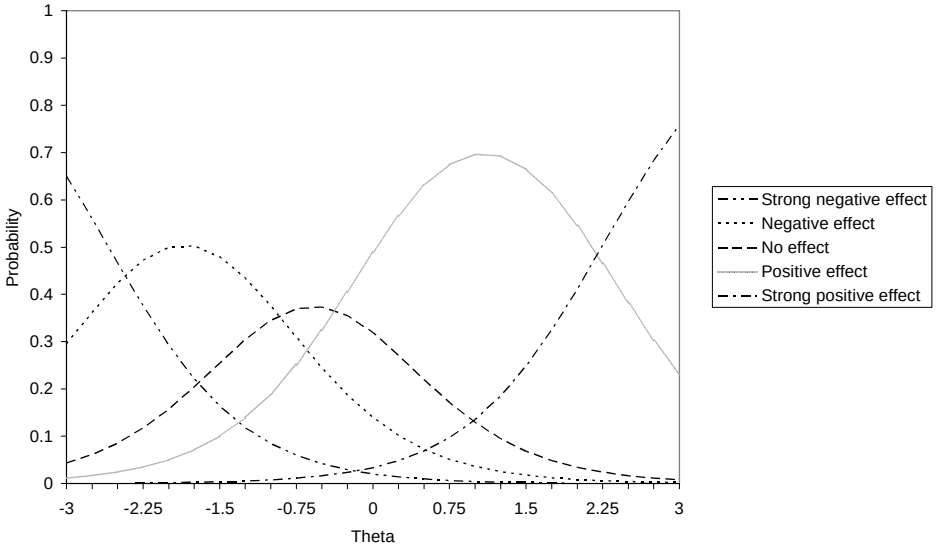

Figure 6. Item characteristic curves for items on Morale Scale (Q10B: Performance evaluation system).

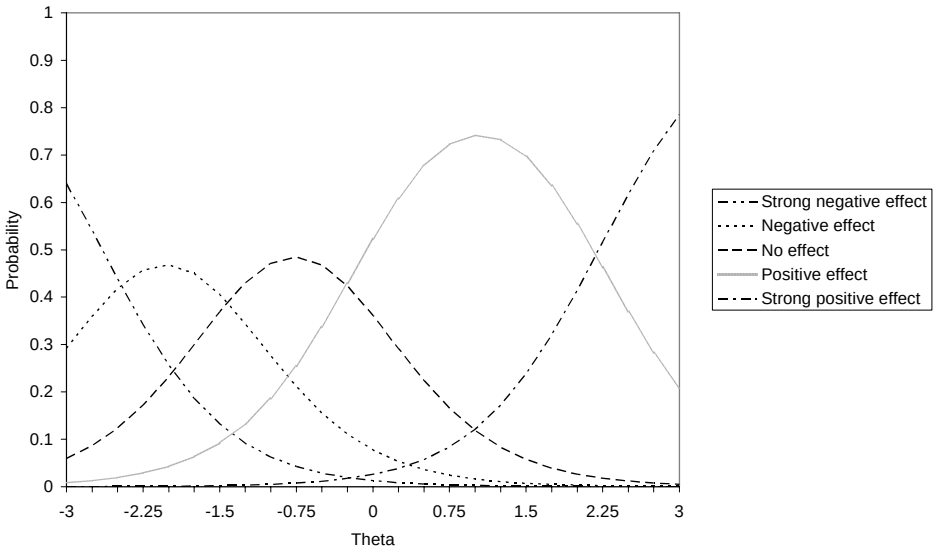

Figure 7. Item characteristic curves for items on Morale Scale (Q10D: Quality of Navy training programs).

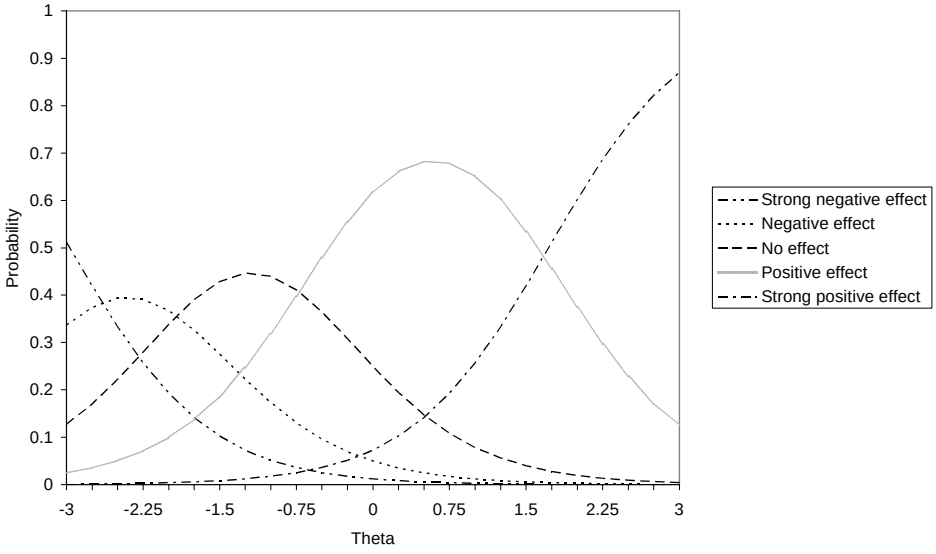

Figure 8. Item characteristic curves for items on Morale Scale (Q10E: Quality of education programs).

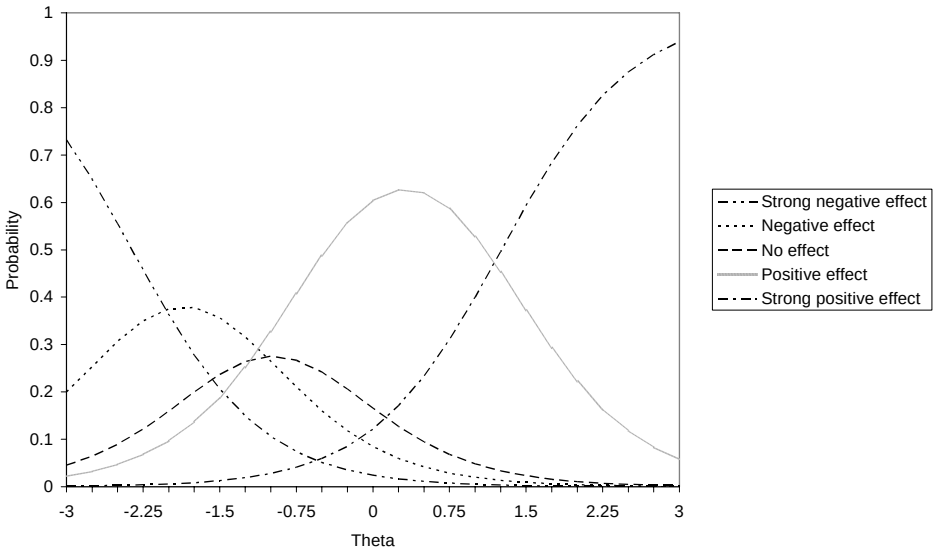

Figure 9. Item characteristic curves for items on Morale Scale (Q10G: Immediate supervisor).

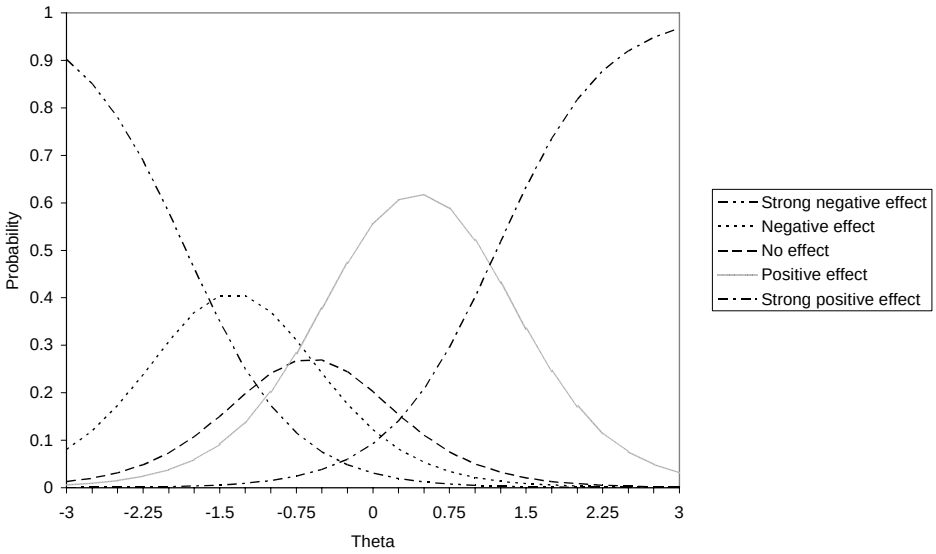

Figure 10. Item characteristic curves for items on Morale Scale (Q10H: Command leadership).

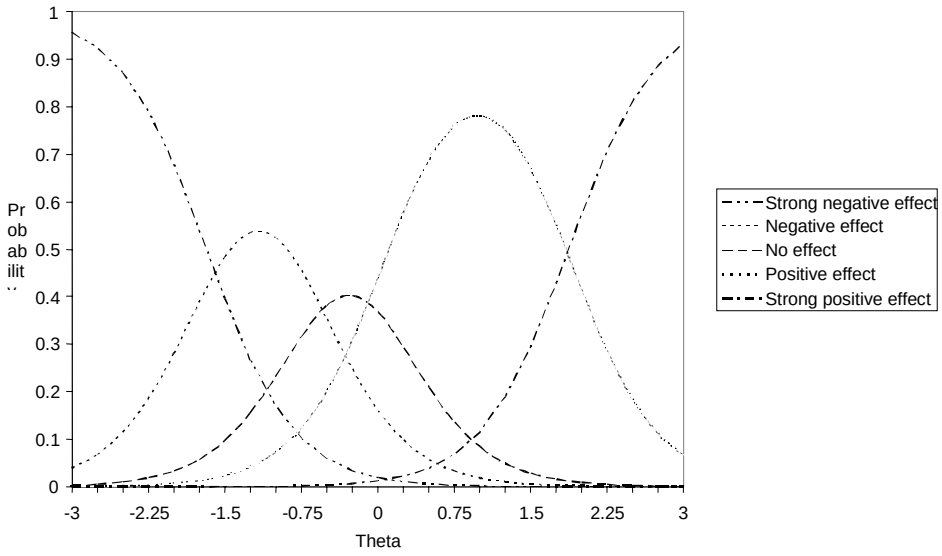

Figure 11. Item characteristic curves for items on Morale Scale (Q10I: Pace of).

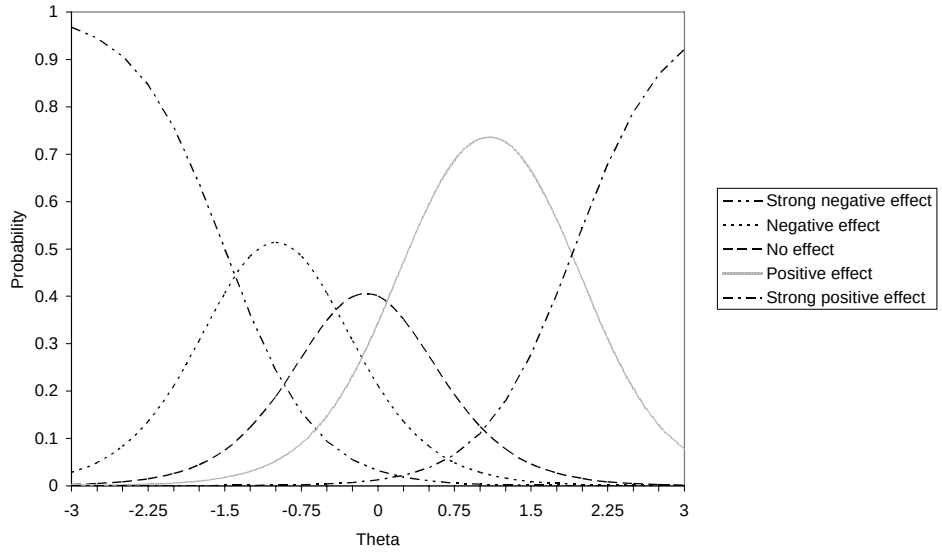

Figure 12. Item characteristic curves for items on Morale Scale (Q10J: Workload).

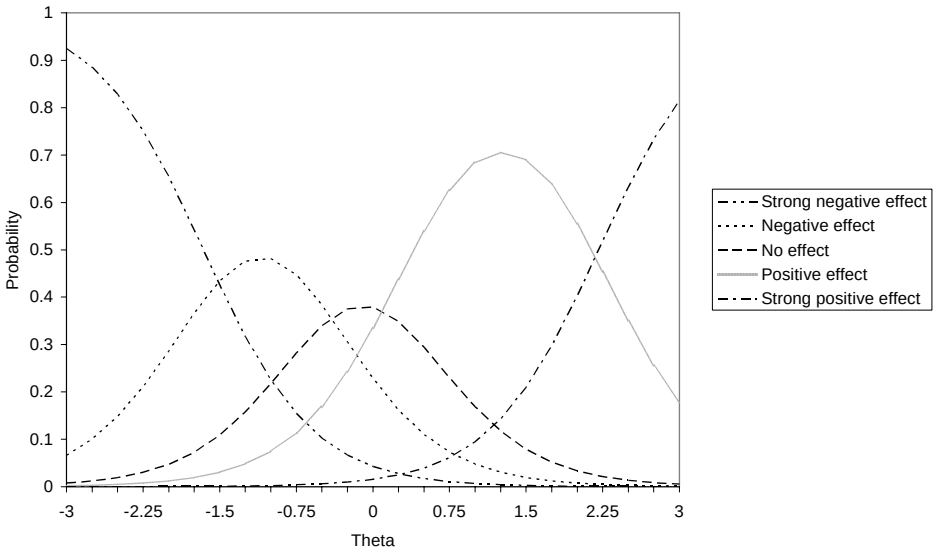

Figure 13. Item characteristic curves for items on Morale Scale (Q10K: Unit/Workgroup manning).

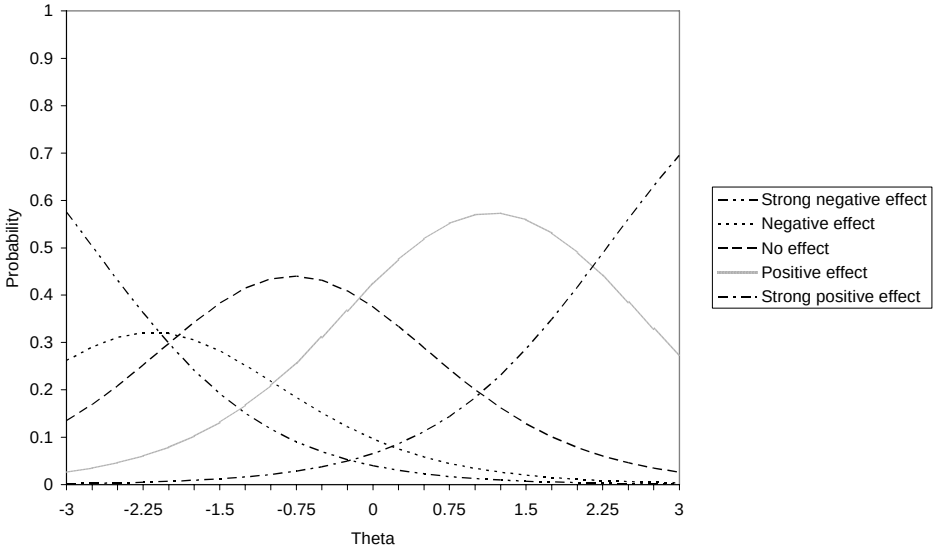

Figure 14. Item characteristic curves for items on Morale Scale (Q10L: Pay/Bonuses/Other compensation).

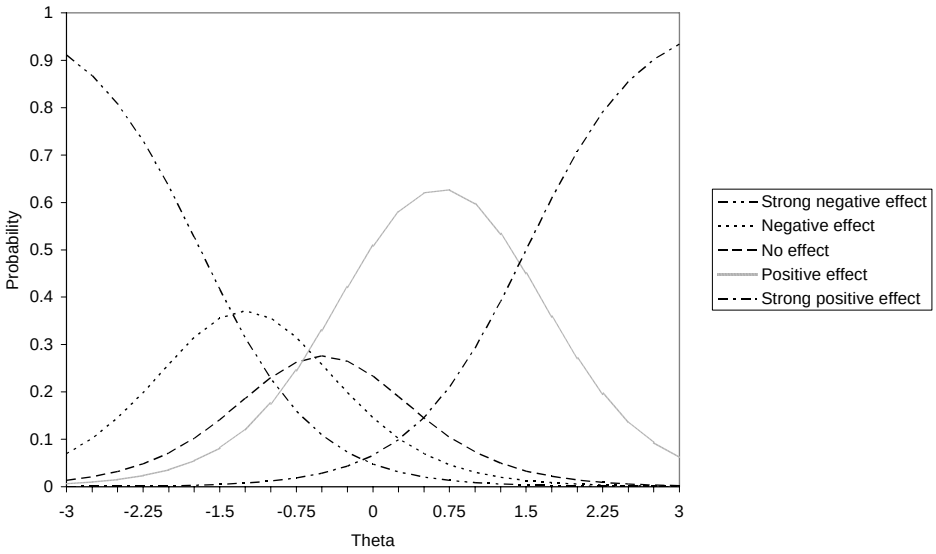

Figure 15. Item characteristic curves for items on Morale Scale (Q10M: Amount of time off).

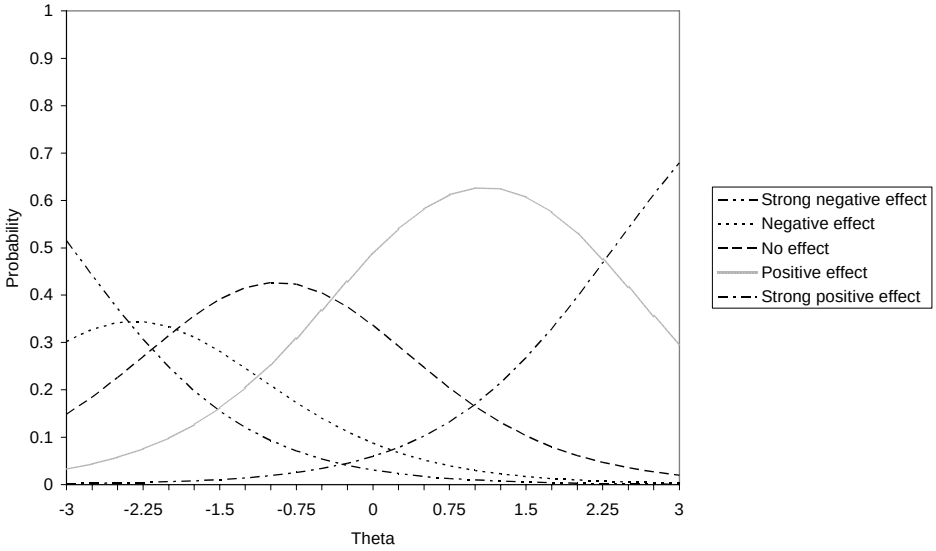

Figure 16. Item characteristic curves for items on Morale Scale (Q10N: Navy support services).

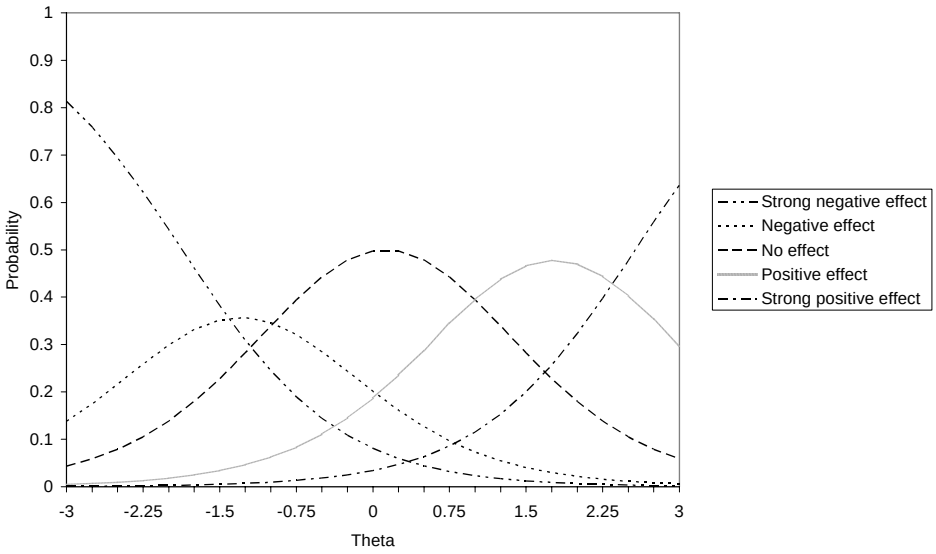

Figure 17. Item characteristic curves for items on Morale Scale (Q10O: TEMPO).

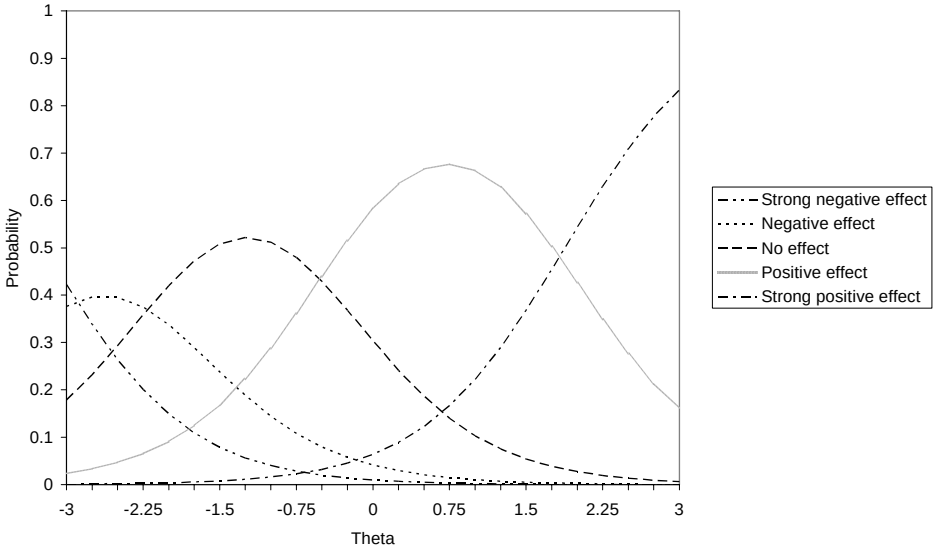

Figure 18. Item characteristic curves for items on Morale Scale (Q10P: Performance of crew/work team on exercises).

Gender Integration

The 3-item gender integration scale is shown in Table 3. Eighty-one percent of respondents indicated that the leadership in the organization is supportive of gender integration, 75 percent indicated that women have the ability to carry out combatant roles. However, a smaller percentage (68 percent) agreed or strongly agreed that women are being successfully integrated.

All three items had high IRT slopes and factor loadings. In particular, item Q12B (women have ability to carry out combatant roles) has a very high slope (a=3.38), suggesting that it may be central to perceptions of the construct of gender integration. The high discrimination for this item is also reflected in the very steep ICCs shown in Figures 19–21.

Table 3
Gender integration scale

Item #	Description	% Satisfied / Very Satisfied	Factor Loading	IRT Parameters				
				a	b1	b2	b3	b4
Q12A	Supportive leadership	81.0	0.71	1.78	-2.91	-2.20	-1.19	0.46
Q12B	Women have ability to carry out combatant roles	74.9	0.86	3.38	-2.03	-1.51	-0.76	0.52
Q12C	Women are being successfully integrated	67.6	0.82	2.82	-2.13	-1.54	-0.58	0.84

Notes:
Analyses are unweighted.
Due to small number of items, exploratory rather than confirmatory factor analysis was conducted. Factor eigenvalue = 1.92.

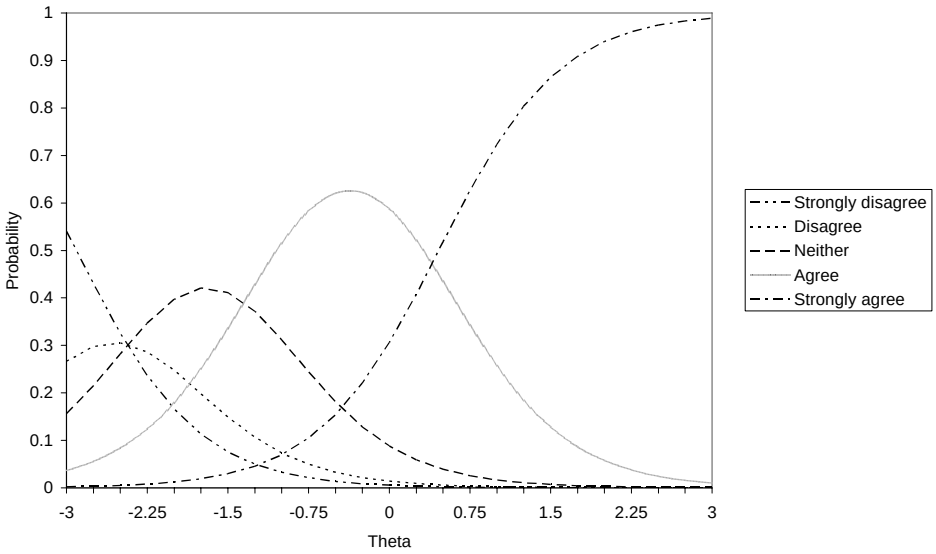

Figure 19. Item characteristic curves for items on Gender Integration Scale (Q12A: Supportive leadership).

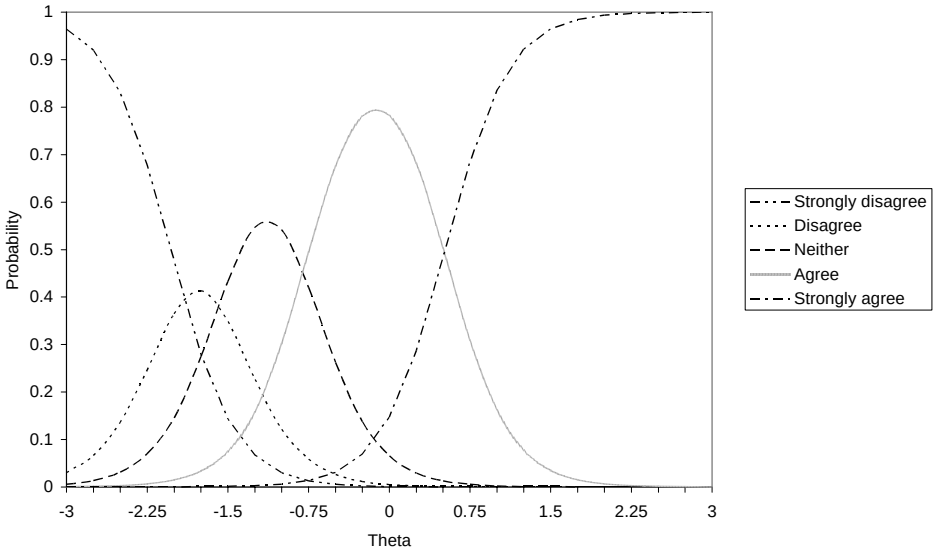

Figure 20. Item characteristic curves for items on Gender Integration Scale (Q12B: Women have ability to carry out combatant roles).

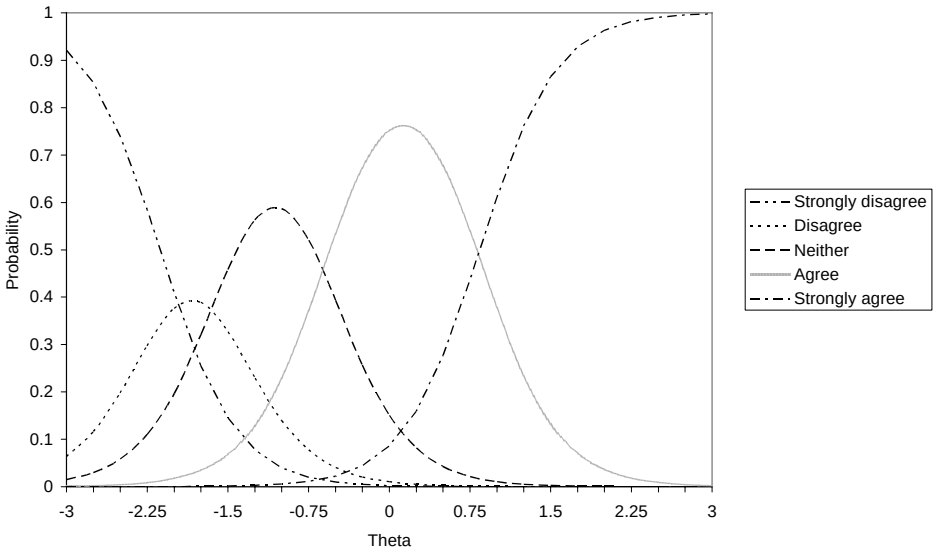

Figure 21. Item Characteristic Curves for Items on Gender Integration Scale (Q12C: Women are being successfully integrated).

Workplace Climate

The nine items comprising the Workplace Climate scale are presented in Table 4. Levels of being satisfied or very satisfied ranges from 45 percent for item Q13H (availability of spare parts and supplies) to 78 percent for item Q13B (amount of responsibility I have in my job). While most items had high slopes and factor loadings, these values are much lower for item Q13H (availability of spare parts and supplies). Visually, this difference may be identified by examining the ICCs in Figures 22–29. The curves for item Q13H are much flatter than those for the other items. These findings suggest that this item may not be related to the other items and should perhaps be removed in future NPS administrations.

Table 4
Workplace Climate Scale

Item #	Description	% Agree/ Strongly Agree	Factor Loading	IRT Parameters				
				a	b1	b2	b3	b4
Q13A	Amount of freedom I am given to do my job	75.1	0.67	2.23	-2.33	-1.28	-0.77	0.69
Q13B	Amount of responsibility I have in my job	77.8	0.72	3.26	-2.17	-1.30	-0.77	0.57
Q13C	Amount of challenge in my job	72.4	0.79	3.30	-1.91	-1.14	-0.59	0.66
Q13D	Opportunity for personal growth and development on the job	64.3	0.81	2.97	-1.76	-0.91	-0.38	0.87
Q13E	Feeling of accomplishment I get from doing my job	67.9	0.79	2.86	-1.76	-1.01	-0.47	0.73
Q13F	Job security	76.8	0.51	1.38	-3.04	-2.13	-1.08	0.67
Q13G	Physical working conditions of my work site	73.4	0.50	1.42	-3.04	-1.76	-0.92	1.14
Q13H	Availability of parts and supplies	45.0	0.35	0.78	-3.66	-1.40	0.30	3.19
Q13I	Flexibility in dealing with family/personal issues	71.1	0.52	1.30	-2.64	-1.77	-0.81	0.81

Notes:
Analyses are unweighted.
Confirmatory factor model fit indices: CFI = 0.93, TLI = 0.89, SRMR = 0.06
Correlated errors permitted between items Q13A, Q13B, and Q13C.

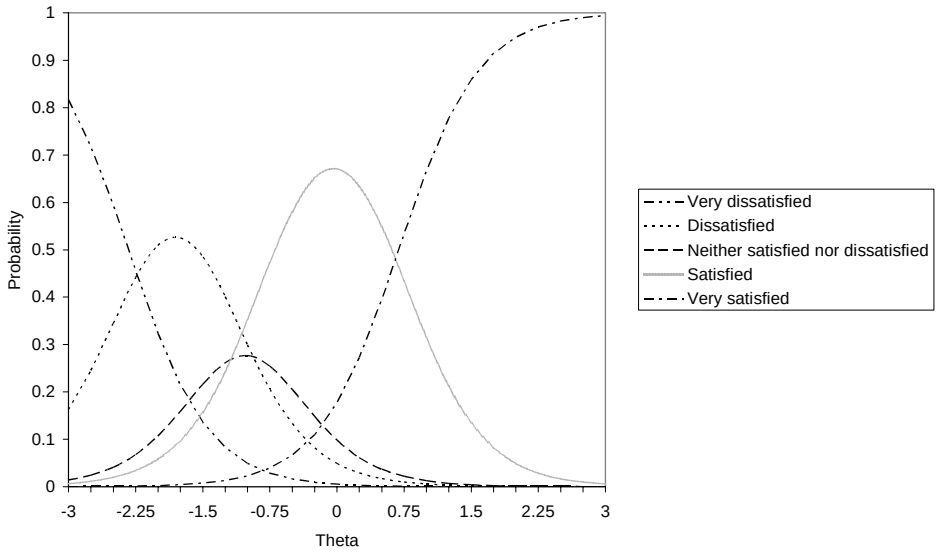

Figure 22. Item characteristic curves for items on Workplace Climate Scale (Q13A: Amount of freedom I am given to do my job).

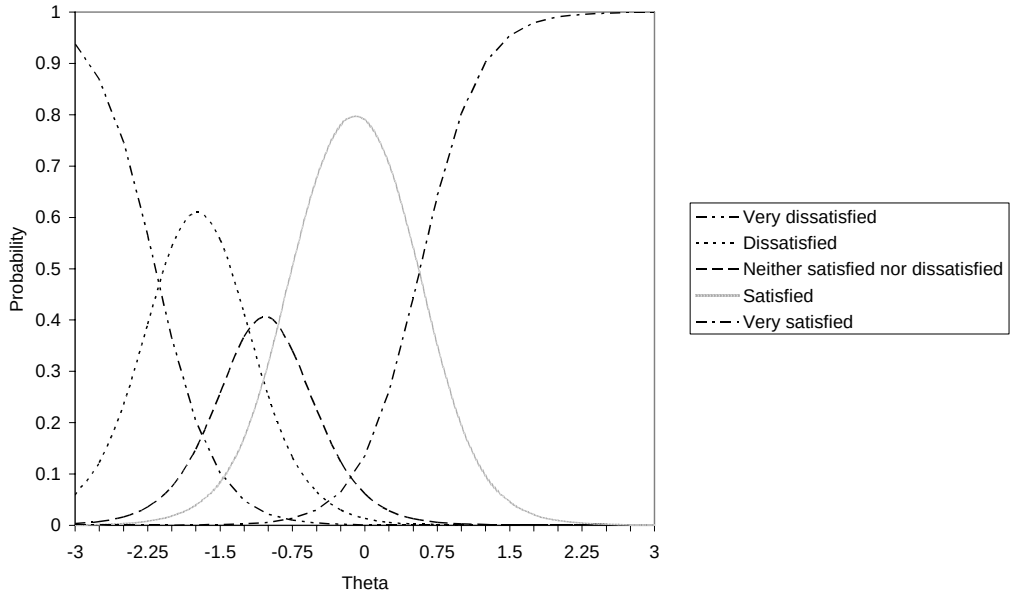

Figure 23. Item characteristic curves for items on Workplace Climate Scale (Q13B: Amount of responsibility I have in my job).

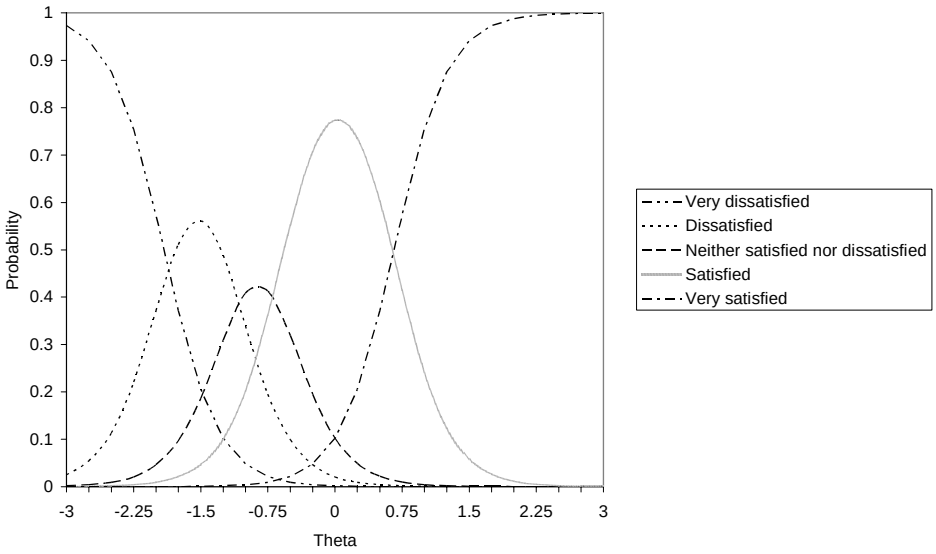

Figure 24. Item characteristic curves for items on Workplace Climate Scale (Q13C: Amount of challenge in my job).

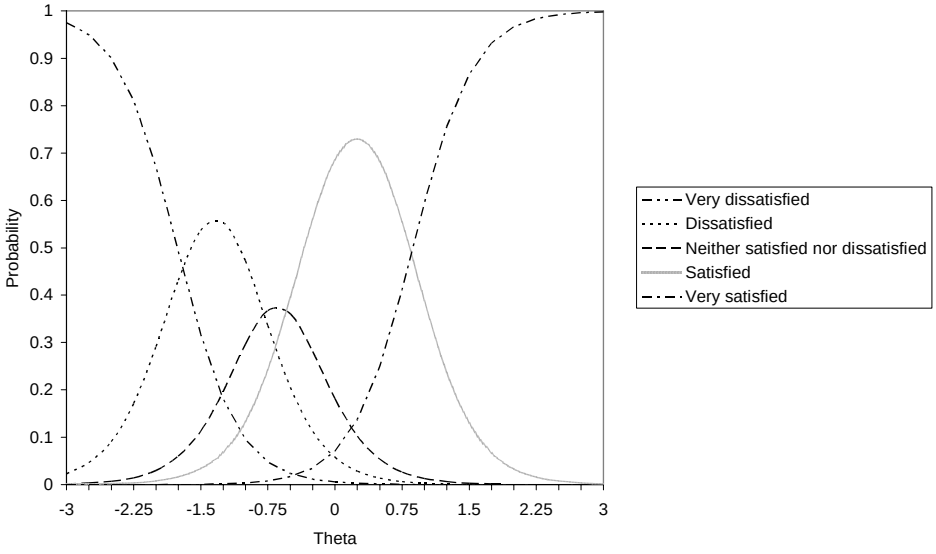

Figure 25. Item characteristic curves for items on Workplace Climate Scale (Q13D: Opportunity for personal growth and development on the job).

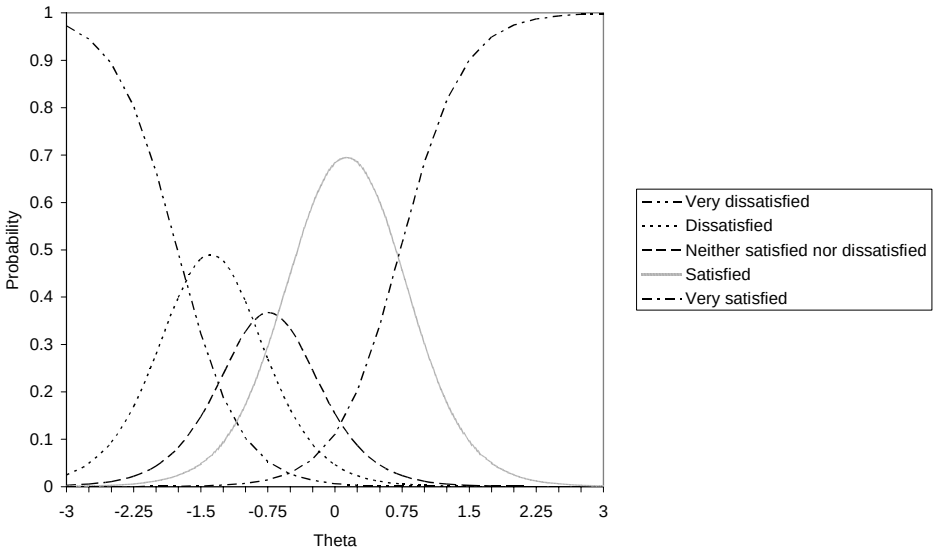

Figure 26. Item characteristic curves for items on Workplace Climate Scale (Q13E: Feeling of accomplishment I get from doing my job).

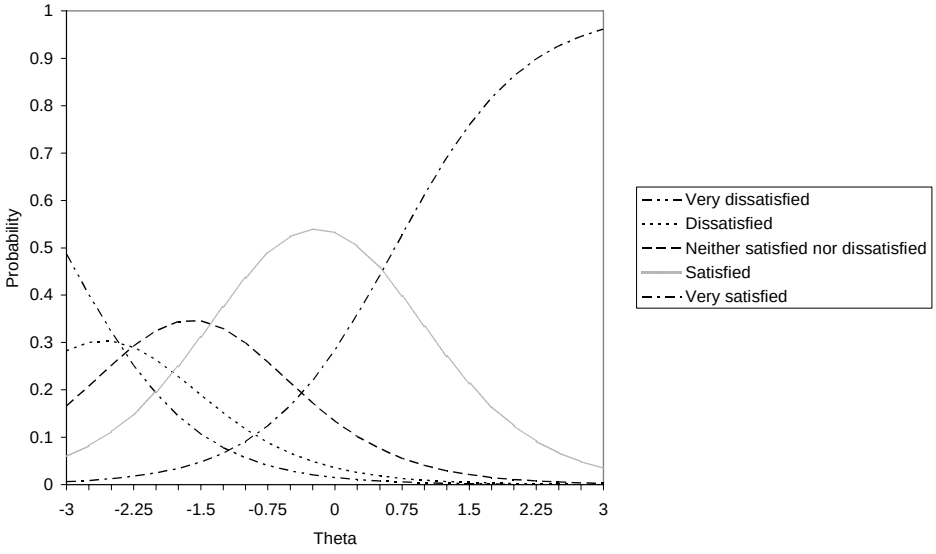

Figure 27. Item characteristic curves for items on Workplace Climate Scale (Q13F: Job security).

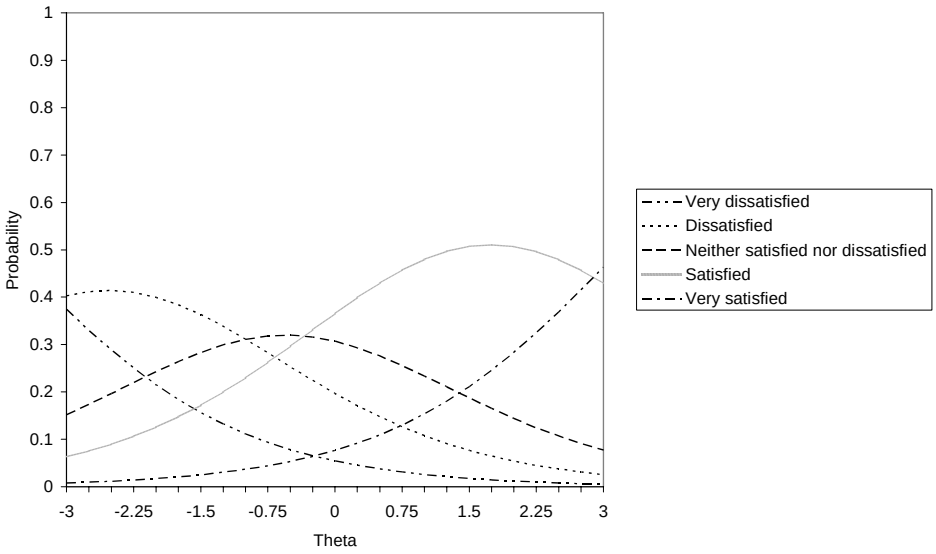

Figure 28. Item characteristic curves for items on Workplace Climate Scale (Q13H: Availability of parts and supplies).

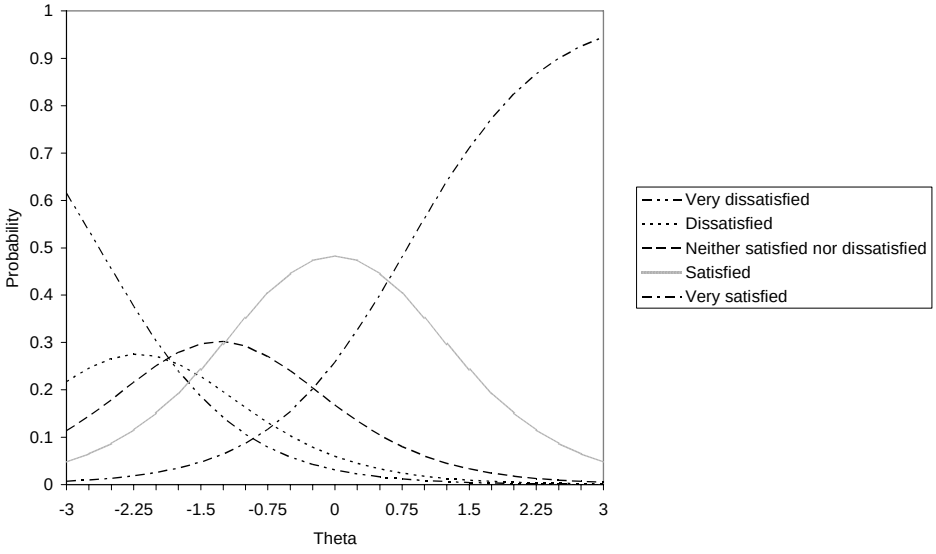

Figure 29. Item characteristic curves for items on Workplace Climate Scale (Q13I: Flexibility in dealing with family/personal issues).

Tempo

Sixty-nine percent of respondents agreed that they are satisfied with the amount of time spent at their permanent duty station and 61 percent were satisfied with their time spent on shore duty (see Table 5). A slightly smaller percentage (57 percent) was satisfied with their time spent on sea duty. All three items had good psychometric properties based on review of their factor loadings, IRT parameters, and ICCs (see Table 5 and Figures 30–32). Items Q19A and Q19B had slightly better discrimination than item Q19C.

Table 5
Tempo Scale

Item #	Description	% Agree / Strongly Agree	Factor Loading	IRT Parameters				
				a	b1	b2	b3	b4
Q19A	Time spent at permanent duty station	68.7	0.86	3.12	-1.93	-1.21	-0.57	0.66
Q19B	Time spent on shore duty	61.0	0.86	3.13	-1.79	-1.19	-0.36	0.80
Q19C	Time spent on sea duty	57.4	0.74	1.52	-2.63	-1.62	-0.30	1.32

Notes:
Analyses are unweighted.
Due to small number of items, exploratory rather than confirmatory factor analysis was conducted. Factor eigenvalue = 2.02.

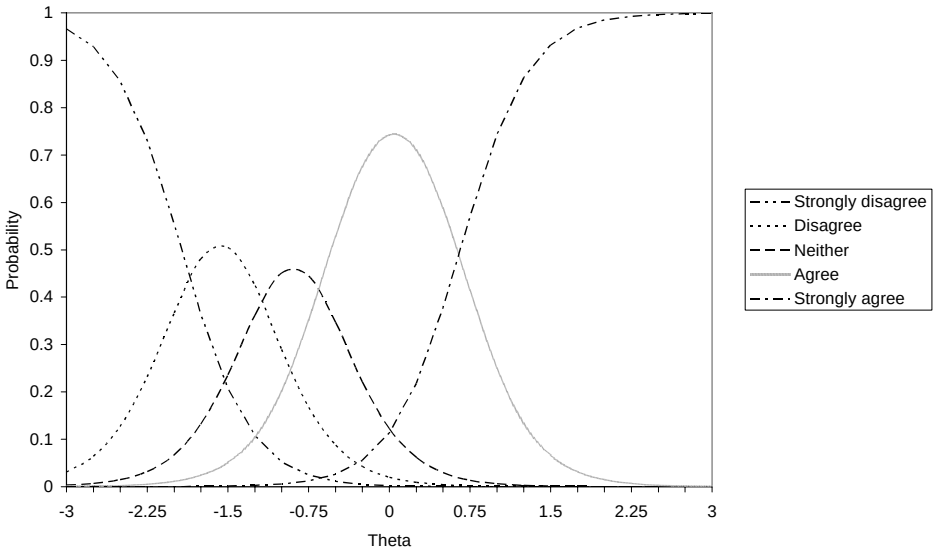

Figure 30. Item characteristic curves for items on Tempo Scale (Q19A: Time spent at permanent duty station).

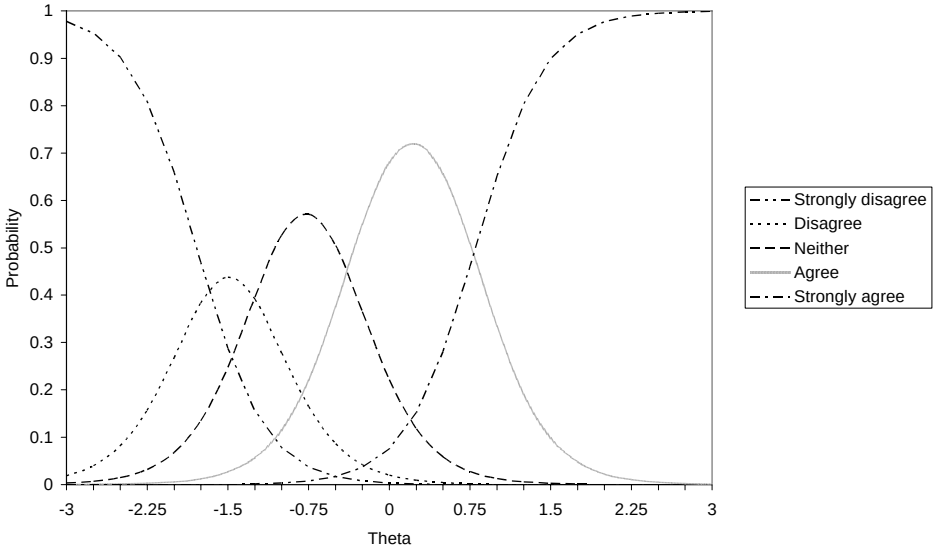

Figure 31. Item characteristic curves for items on Tempo Scale (Q19B: Time spent on shore duty).

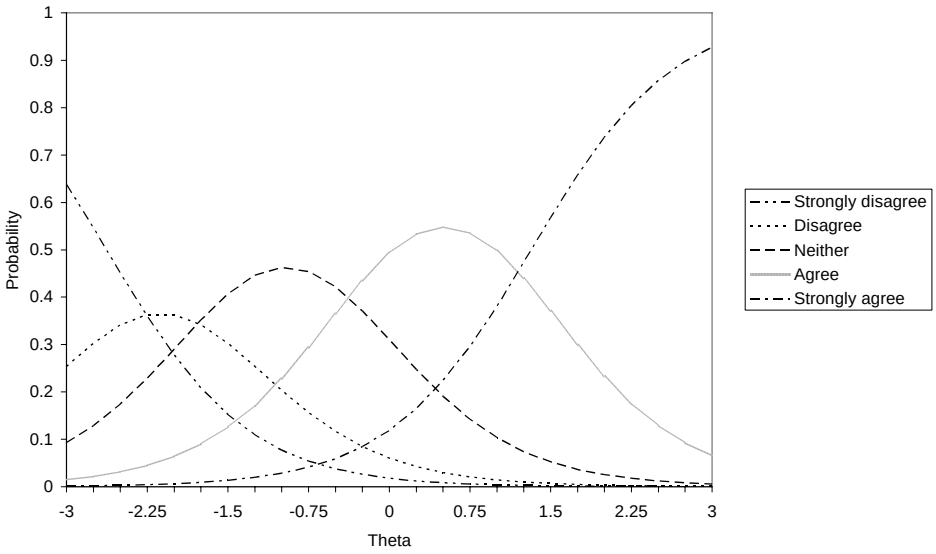

Figure 32. Item characteristic curves for items on Tempo Scale (Q19C: Time spent on sea duty).

Impact on Personal Life

The brief 3-item Impact on Personal Life scale contains items with a wide range of agreement levels (see Table 6). While only 29 percent indicated that they had difficulty juggling career and personal life (Q21C), 61 percent indicated that their career causes significant separation from family. All three items had very similar factor loadings (ranging from 0.82 to 0.89), high IRT slopes, and a spread of threshold parameters (see Table 6 and Figures 33–35).

Table 6
Impact on Personal Life Scale

Item #	Description	% Agree / Strongly Agree	Factor Loading	IRT Parameters				
				a	b1	b2	b3	b4
Q21A	Career gets in way of personal life	40.1	0.89	4.21	-1.55	-0.41	0.26	1.17
Q21B	Career causes significant separation from family	60.6	0.82	2.00	-2.31	-1.04	-0.31	0.92
Q21C	Difficulty juggling career and personal life	28.7	0.85	2.37	-1.48	-0.21	0.65	1.68

Notes:
Analyses are unweighted.
Due to small number of items, exploratory rather than confirmatory factor analysis was conducted. Factor eigenvalue = 2.18.

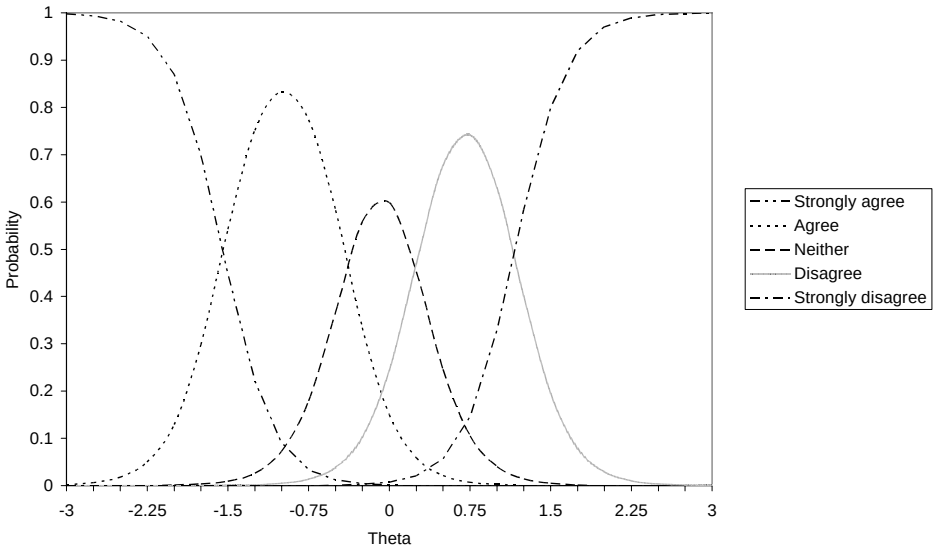

Figure 33. Item characteristic curves for items on Impact on Personal Life Scale (Q21A: Career gets in way of personal life).

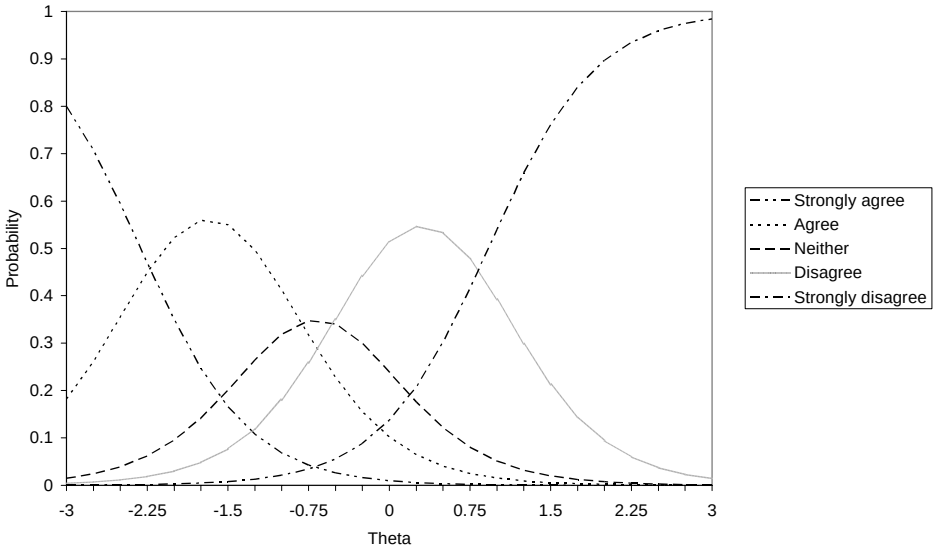

Figure 34. Item characteristic curves for items on Impact on Personal Life Scale (Q21B: Career causes significant separation from family).

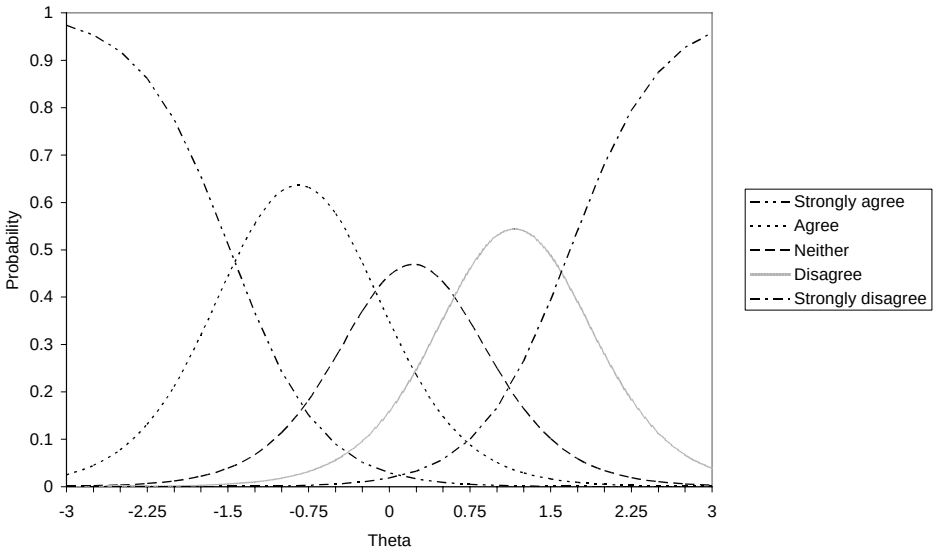

Figure 35. Item characteristic curves for items on Impact on Personal Life Scale (Q21C: Difficulty juggling career and personal life).

Immediate Supervisor

The Immediate Supervisor scale contains the six items shown in Table 7. All items on this scale had very high slopes and factor loadings as reflected in their steep item characteristic curves (see Figures 36–41). In particular, the slope for the last item on the scale, Q23F (Satisfied with immediate supervisor), was extremely high (slope = 9.14). As expected, this item may be a particularly salient indicator of a respondent's perceptions of his/her immediate supervisor.

Table 7
Immediate Supervisor Scale

Item #	Description	% Agree / Strongly Agree	Factor Loading	IRT Parameters				
				a	b1	b2	b3	b4
Q23A	Adequate training/expertise	81.6	0.76	3.07	-1.87	-1.13	-0.74	0.54
Q23B	Deals well with subordinates	71.5	0.91	5.60	-1.36	-0.76	-0.36	0.65
Q23C	Deals well with superiors	75.5	0.79	3.36	-1.79	-1.11	-0.52	0.71
Q23D	Provides adequate support and guidance	68.1	0.91	5.59	-1.34	-0.74	-0.27	0.73
Q23E	Responsive to Sailor needs and concerns	72.2	0.88	4.89	-1.41	-0.86	-0.38	0.69
Q23F	Satisfied with immediate supervisor	72.6	0.96	9.14	-1.24	-0.75	-0.38	0.59

Notes:
Analyses are unweighted.
Confirmatory factor model fit indices: CFI = 0.99, TLI = 0.98, SRMR = 0.02.

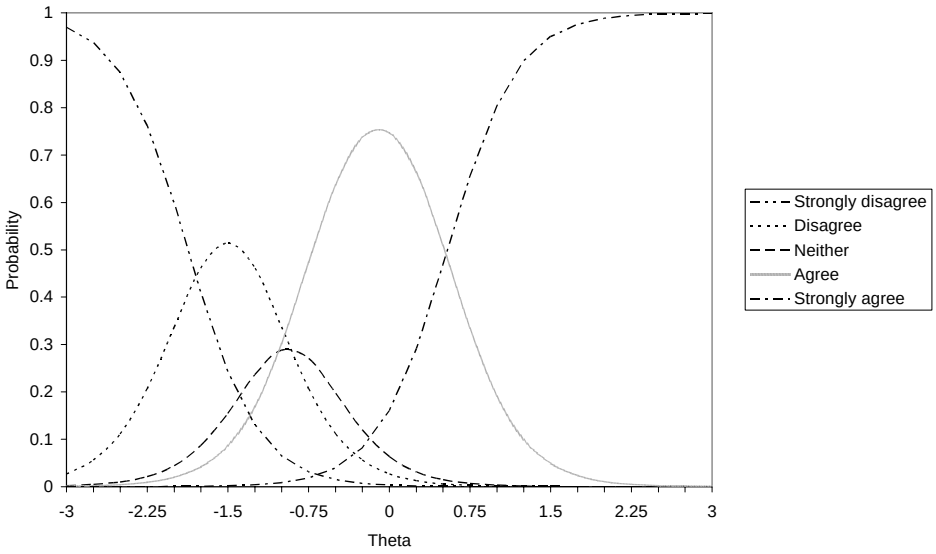

Figure 36. Item characteristic curves for items on Immediate Supervisor Scale (Q23A: Adequate training/expertise).

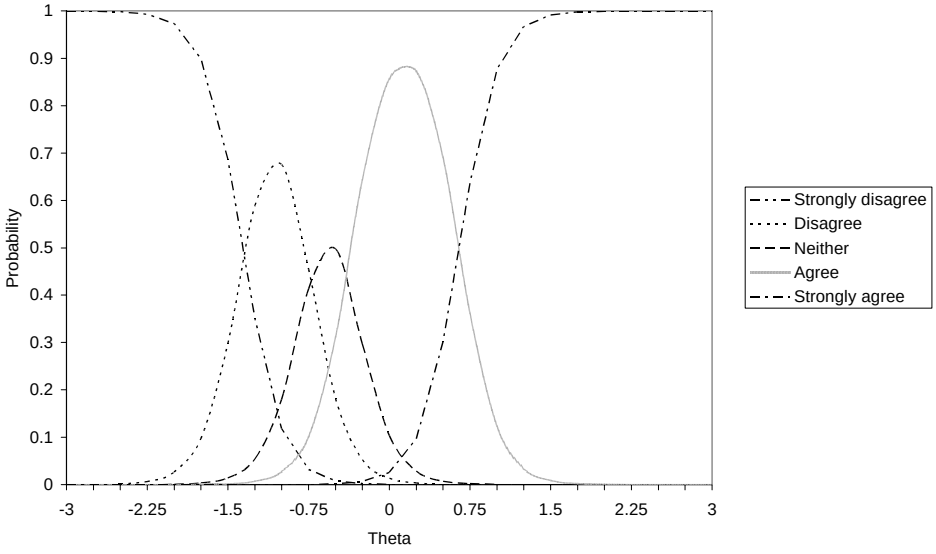

Figure 37. Item characteristic curves for items on Immediate Supervisor Scale (Q23B: Deals well with subordinates).

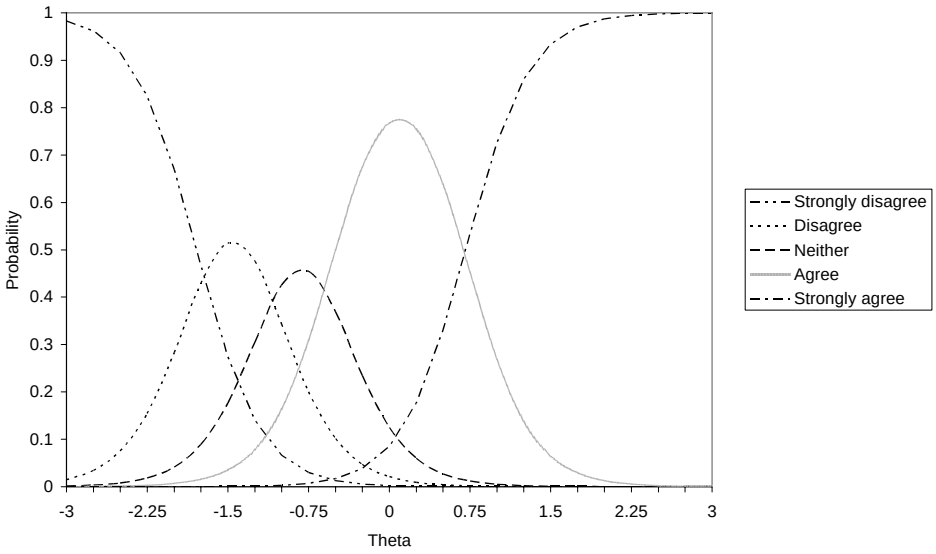

Figure 38. Item characteristic curves for items on Immediate Supervisor Scale (Q23C: Deals well with superiors).

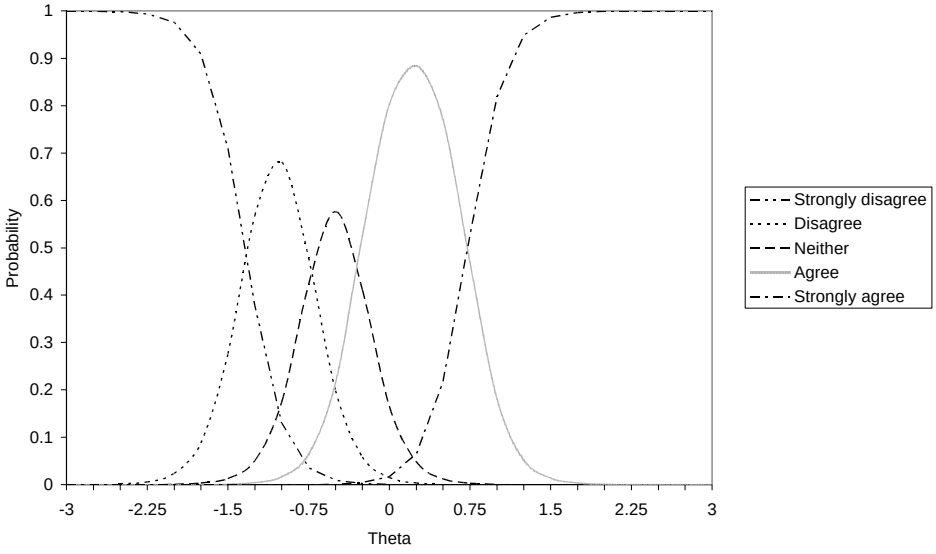

Figure 39. Item characteristic curves for items on Immediate Supervisor Scale (Q23D: Provides adequate support and guidance).

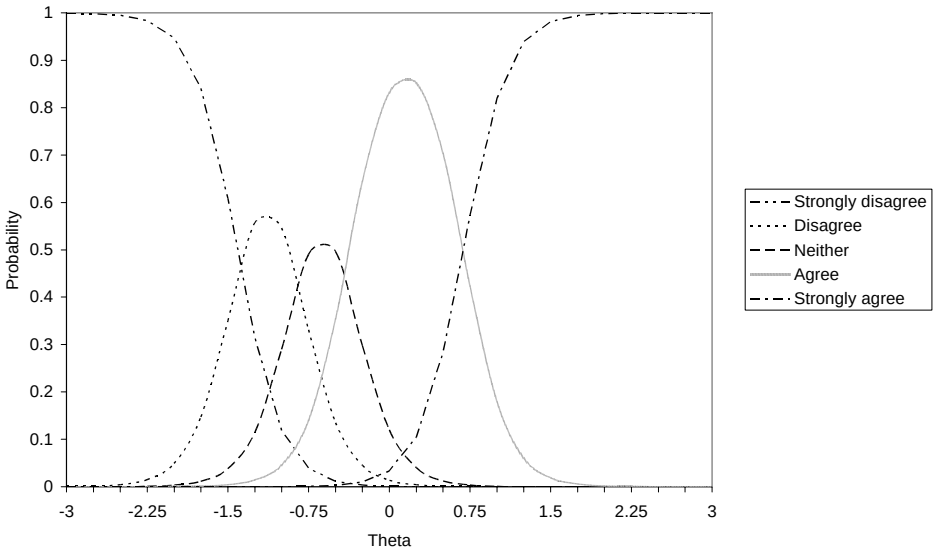

Figure 40. Item characteristic curves for items on Immediate Supervisor Scale (Q23E: Responsive to Sailor needs and concerns).

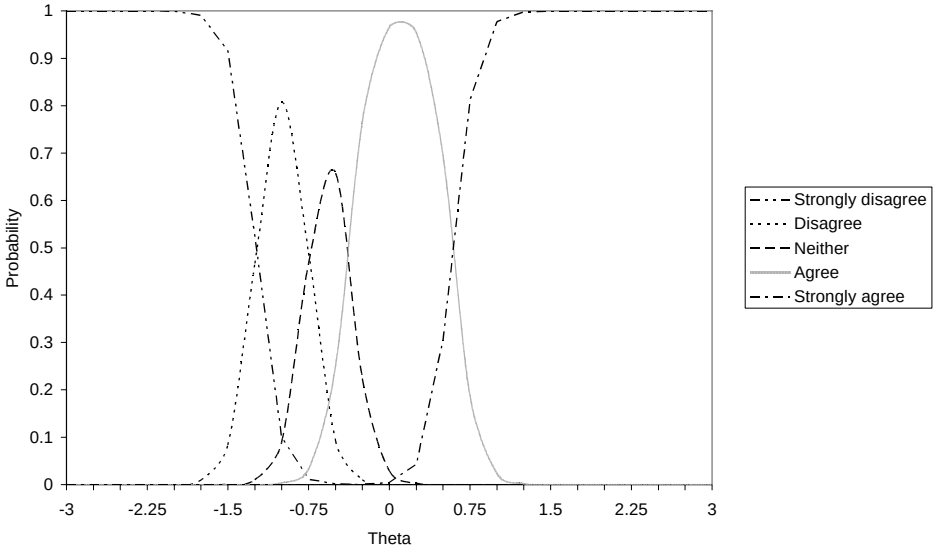

Figure 41. Item characteristic curves for items on Immediate Supervisor Scale (Q23F: Satisfied with immediate supervisor).

Overall Command Leadership

The items on the Overall Command Leadership exhibited good psychometric properties as evidenced by their high factor loadings, IRT slopes, and steep ICCs (see Table 8 and Figures 42–47). Similar to the Immediate Supervisor scale, the rating of overall satisfaction item, Q24F (Satisfied with command leadership), has the highest IRT slope (a=7.93), suggesting that this item is the most discriminating measure of perceptions of overall command leadership.

Table 8
Overall Command Leadership Scale

Item #	Description	% Agree/ Strongly Agree	Factor Loading	IRT Parameters				
				a	b1	b2	b3	b4
Q24A	Adequate training/expertise	81.2	0.77	2.95	-0.71	0.75	1.35	2.05
Q24B	Deals well with subordinates	68.4	0.90	5.39	-0.89	0.32	0.80	1.47
Q24C	Deals well with superiors	74.8	0.79	3.38	-0.90	0.49	1.26	1.94
Q24D	Provides adequate support and guidance	66.7	0.90	5.63	-0.94	0.27	0.80	1.36
Q24E	Responsive to Sailor needs and concerns	68.4	0.89	5.13	-0.88	0.32	0.83	1.33
Q24F	Satisfied with command leadership	67.9	0.94	7.93	-0.84	0.30	0.78	1.28

Notes:
Analyses are unweighted.
Confirmatory factor model fit indices: CFI = 0.98, TLI = 0.97, SRMR = .02.

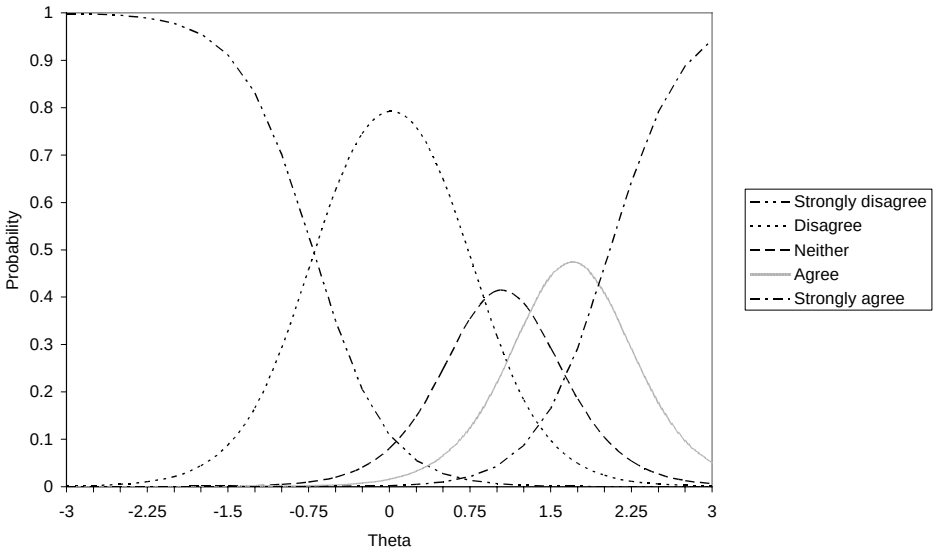

Figure 42. Item characteristic curves for items on Overall Command Leadership Scale (Q24A: Adequate training and expertise).

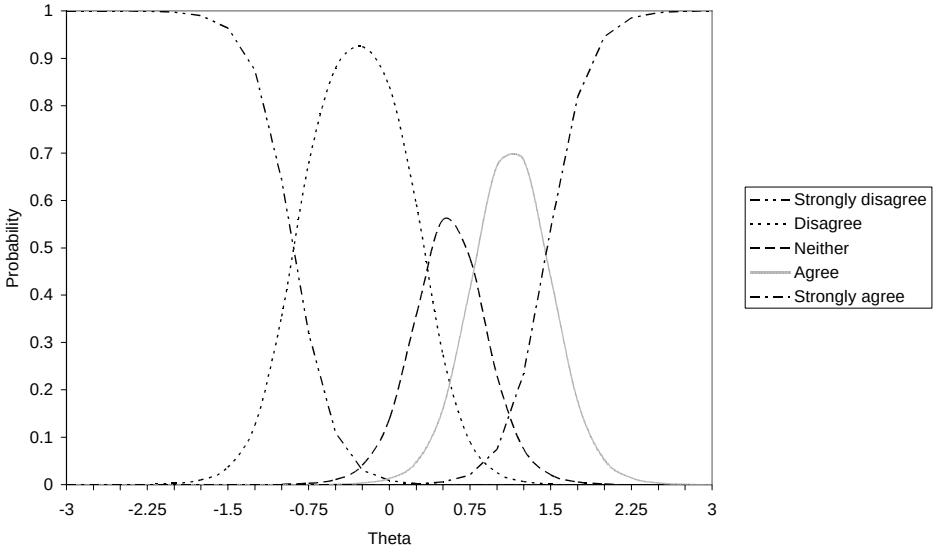

Figure 43. Item characteristic curves for items on Overall Command Leadership Scale (Q24B: Deals well with subordinates).

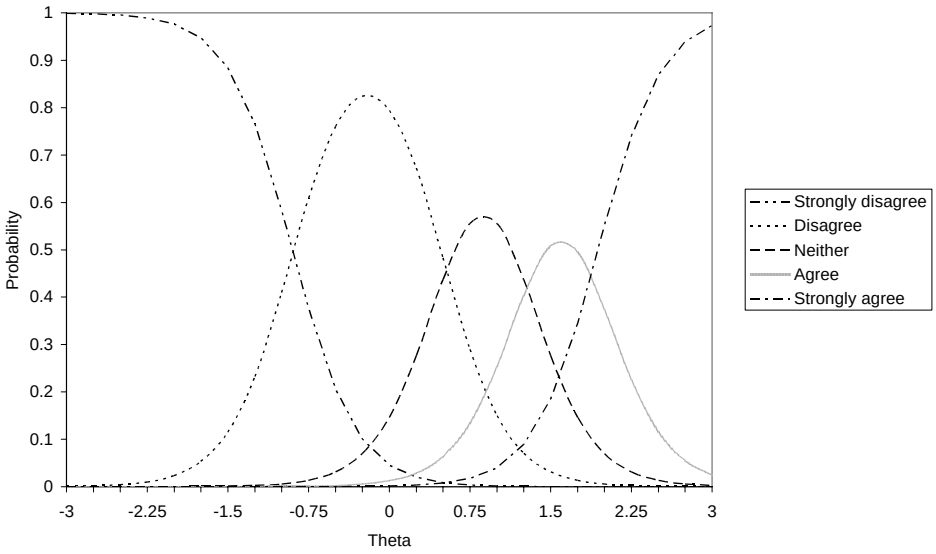

Figure 44. Item characteristic curves for items on Overall Command Leadership Scale (Q24C: Deals well with superiors).

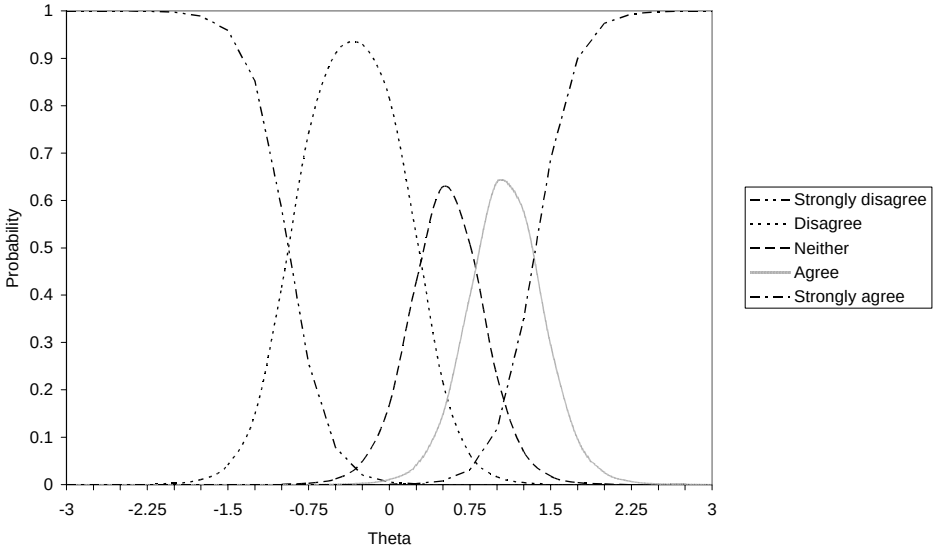

Figure 45. Item characteristic curves for items on Overall Command Leadership Scale (Q24D: Provides adequate support and guidance).

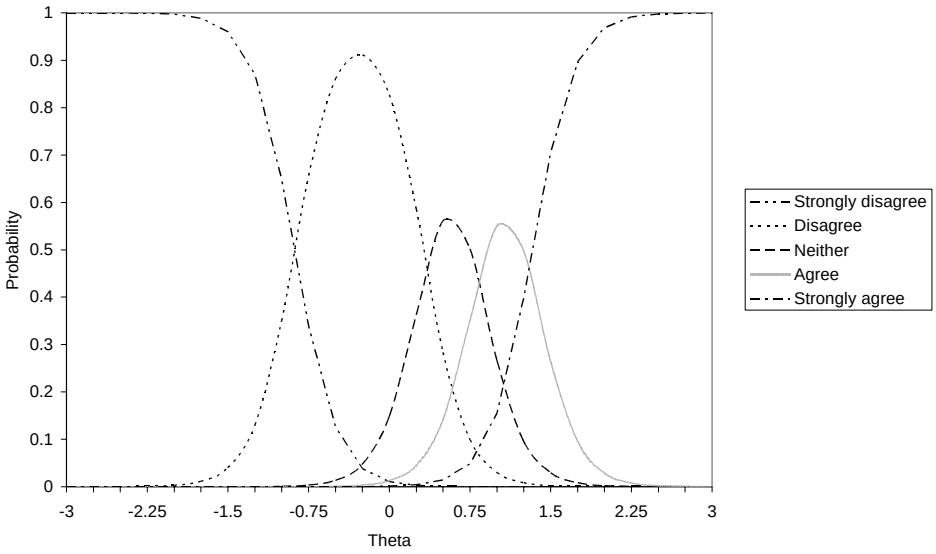

Figure 46. Item characteristic curves for items on Overall Command Leadership Scale (Q24E: Responsive to Sailor needs and concerns).

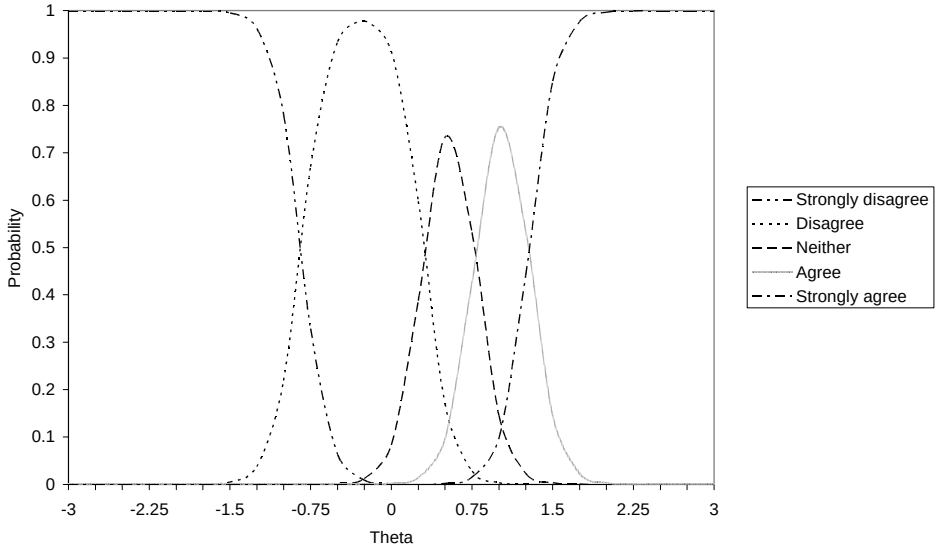

Figure 47. Item characteristic curves for items on Overall Command Leadership Scale (Q24F: Satisfied with command leadership).

Communication

NPS respondents are asked to indicate their level of agreement with the six items shown in Table 9. Respondents were least likely to agree that they have heard rumors about new policies (item Q25F) and most likely to agree that command leadership communicates positive attitude about the Navy (item Q25C). While the first five items (Q25A-E) performed well, the last item, Q25F (heard rumors about new policies) had a very low factor loading (loading=0.08) and IRT slope (a=0.28). As shown in Figures 48–53, the curves for this item are nearly flat. The thresholds for this item were also at the extremes (b1=-5.78 and b4=10.22), suggesting that a respondent must be very satisfied or dissatisfied with communication to endorse any response option other than the middle one, neither agree nor disagree.

Table 9
Communication Scale

Item #	Description	% Agree / Strongly Agree	Factor Loading	IRT Parameters				
				a	b1	b2	b3	b4
Q25A	Navy clearly communicates goals and strategies	59.1	0.49	1.81	-2.54	-1.09	-0.32	1.80
Q25B	Senior leadership keeps Sailors informed	60.2	0.65	2.66	-2.09	-0.94	-0.32	1.56
Q25C	Command leadership communicates positive attitude about Navy	72.3	0.66	1.86	-2.57	-1.65	-0.78	1.08
Q25D	Command leadership keeps me informed of Navy policies	66.8	0.86	3.09	-2.15	-1.17	-0.49	1.15
Q25E	Someone in chain of command talked about new career initiatives	49.9	0.65	1.72	-1.68	-0.58	-0.03	1.54
Q25F	Heard rumors about new policies	48.3	0.08	0.28	-5.78	-0.30	3.91	10.22

Notes:
Analyses are unweighted.
Confirmatory factor model fit indices: CFI = 0.99, TLI = 0.97, SRMR = 0.03.
Correlated errors permitted between items Q25 A and Q25B.

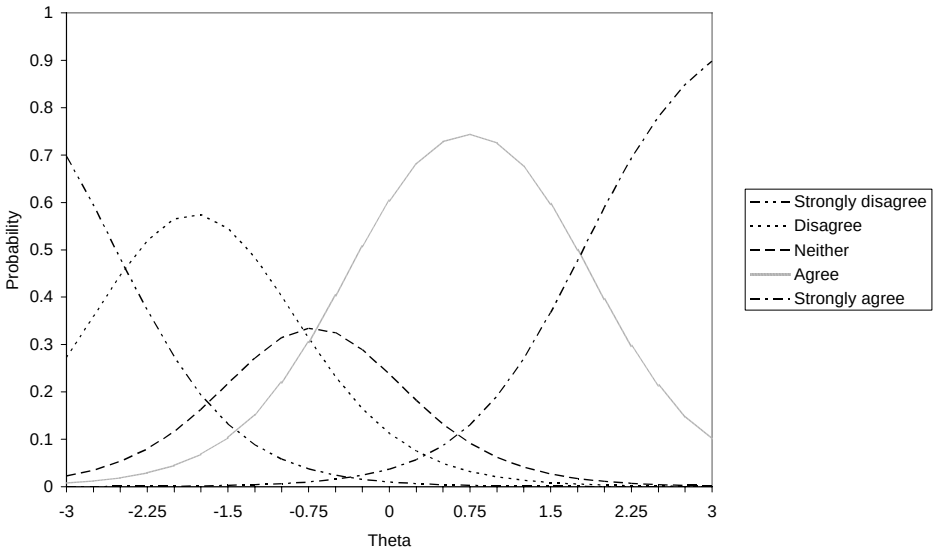

Figure 48. Item characteristic curves for items on Communication Scale (Q25A: Navy clearly communicates goals and strategies).

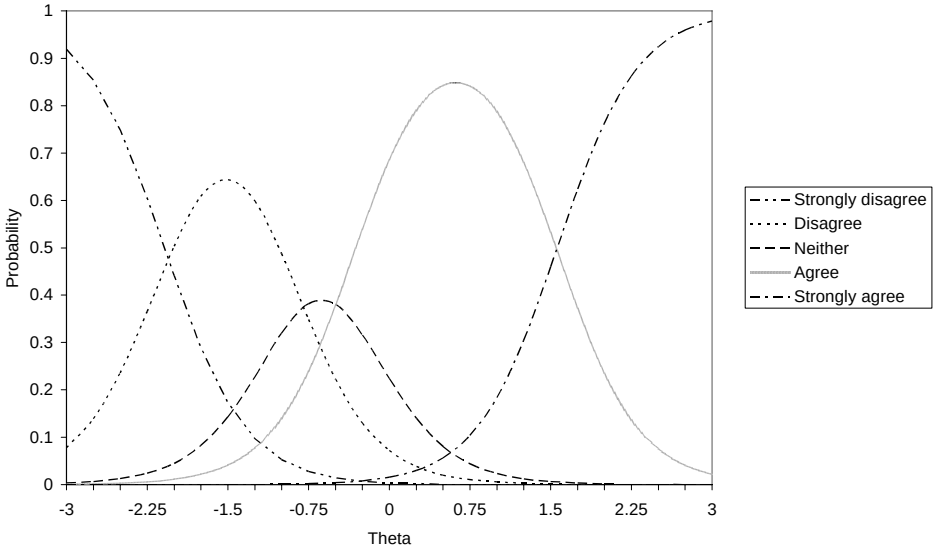

Figure 49. Item characteristic curves for items on Communication Scale (Q25B: Senior leadership keeps Sailors informed).

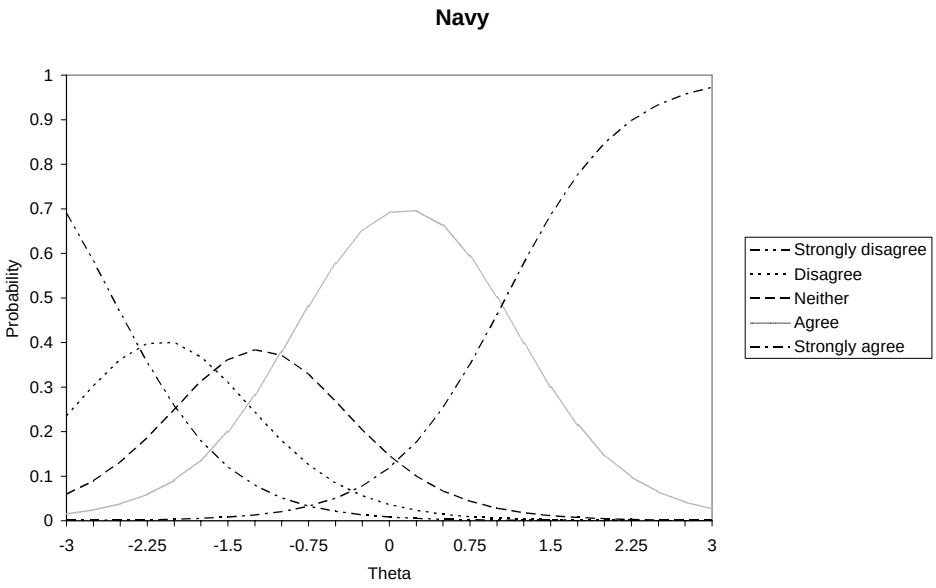

Figure 50. Item characteristic curves for items on Communication Scale (Q25C: Command leadership communicates positive attitude about navy).

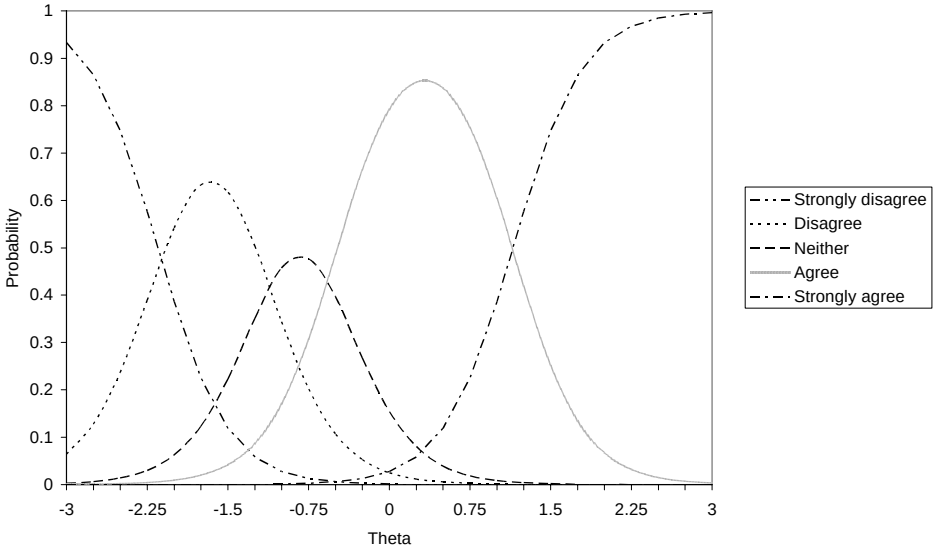

Figure 51. Item characteristic curves for items on Communication Scale (Q25D: Command leadership keeps me informed of Navy policies).

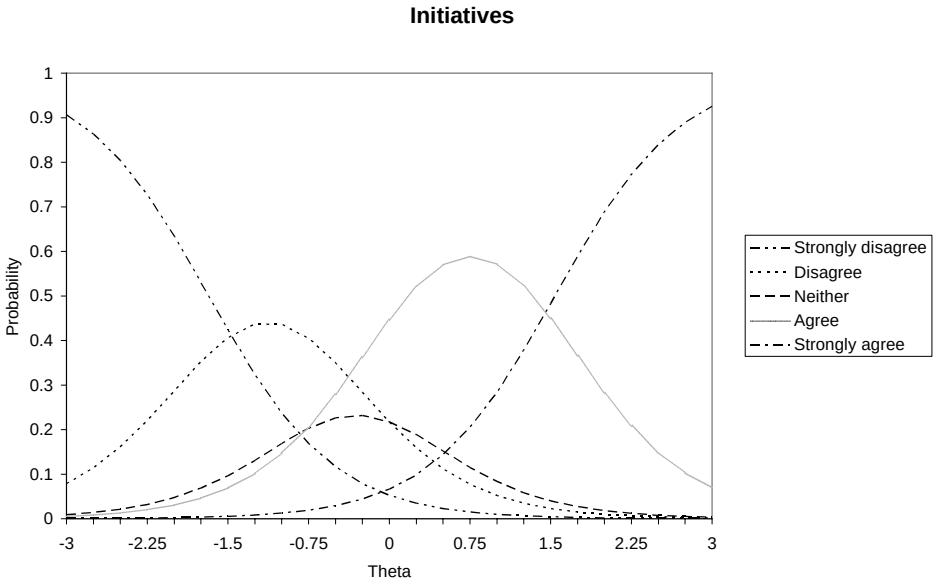

Figure 52. Item characteristic curves for items on Communication Scale (Q25E: Someone in chain of command talked about new career initiatives).

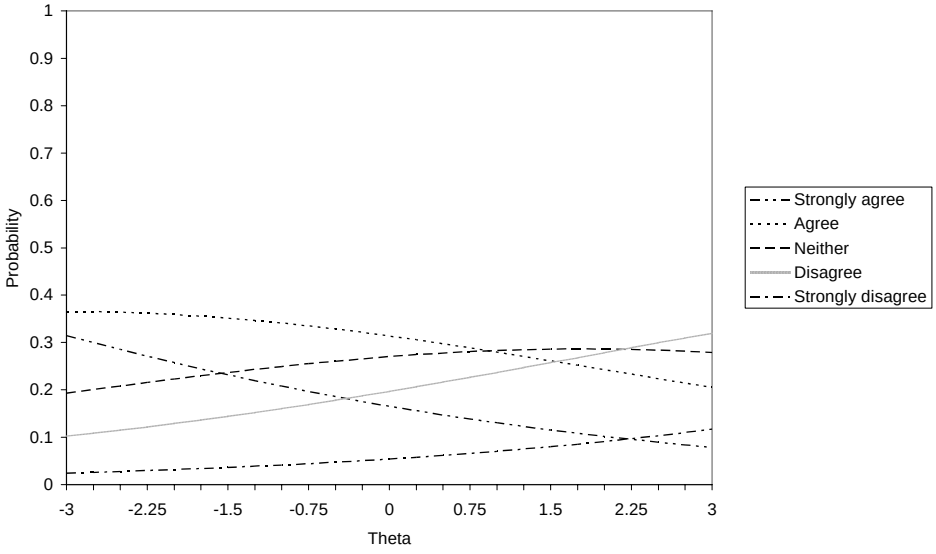

Figure 53. Item characteristic curves for items on Communication Scale (Q25F: Heard rumors about new policies).

Job Security

To assess job security, respondents were asked the six items shown in Table 10. While the first three items (Q26A-C) had high slopes and factor loadings, the remaining three items (Q26D-F) had low factor loadings (ranging from 0.14 to 0.33) and slopes (ranging from 0.28 to 0.78). As shown in Figures 54–59, the ICCs for items Q26D to Q26F are almost flat. These results suggest that perhaps this scale should be divided into two scales with the first including items Q26A-C and the second including items Q26D-F.

Table 10
Job Security Scale

Item #	Description	% Agree / Strongly Agree	Factor Loading	IRT Parameters				
				a	b1	b2	b3	b4
Q26A	Feel positive about future Navy career	56.6	0.71	2.15	-1.78	-0.86	-0.22	1.12
Q26B	Navy is doing all it can to protect my job security	44.6	0.81	3.13	-1.64	-0.75	0.12	1.38
Q26C	Future in Navy appears secure	65.6	0.86	3.69	-1.67	-0.98	-0.41	0.89
Q26D	Willing to change rating/designator to stay in Navy	36.6	0.14	0.28	-4.62	-1.05	2.01	6.83
Q26E	Concerned fellow Sailors may lose their jobs	46.3	0.21	0.49	-3.86	-0.33	2.41	6.22
Q26F	Concerned future policy changes will hurt job	45.0	0.33	0.78	-2.46	-0.29	1.74	4.15

Notes:
Analyses are unweighted.
Confirmatory factor model fit indices: CFI = 0.96, TLI = 0.93, SRMR = 0.05.
Correlated errors permitted between items Q26E and Q26F.

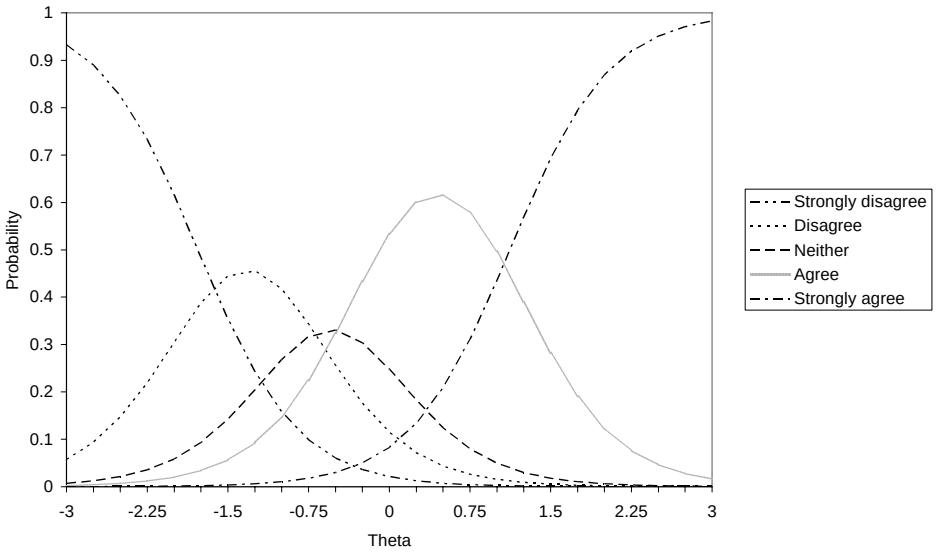

Figure 54. Item characteristic curves for items on Job Security Scale (Q26A: I feel positive about my future Navy career).

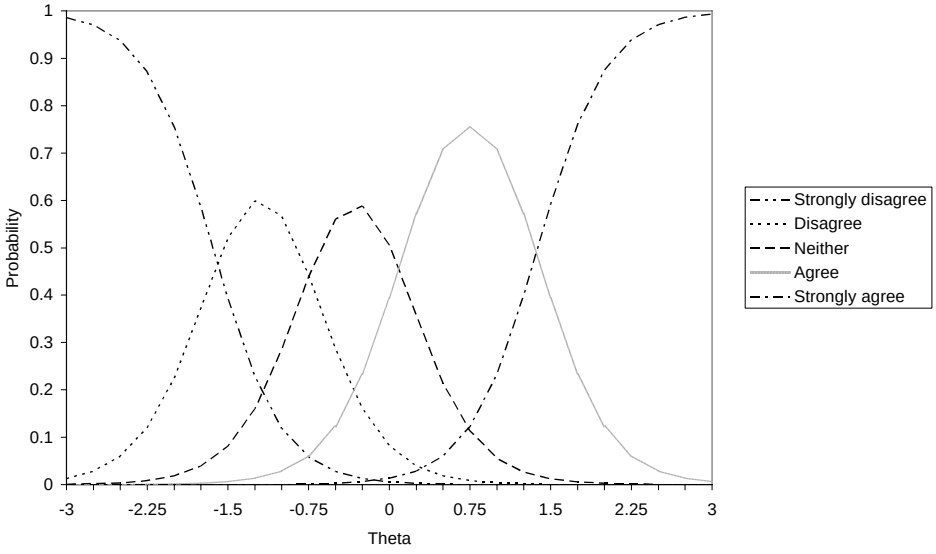

Figure 55. Item characteristic curves for items on Job Security Scale (Q26B: The Navy is doing all it can to protect my job security).

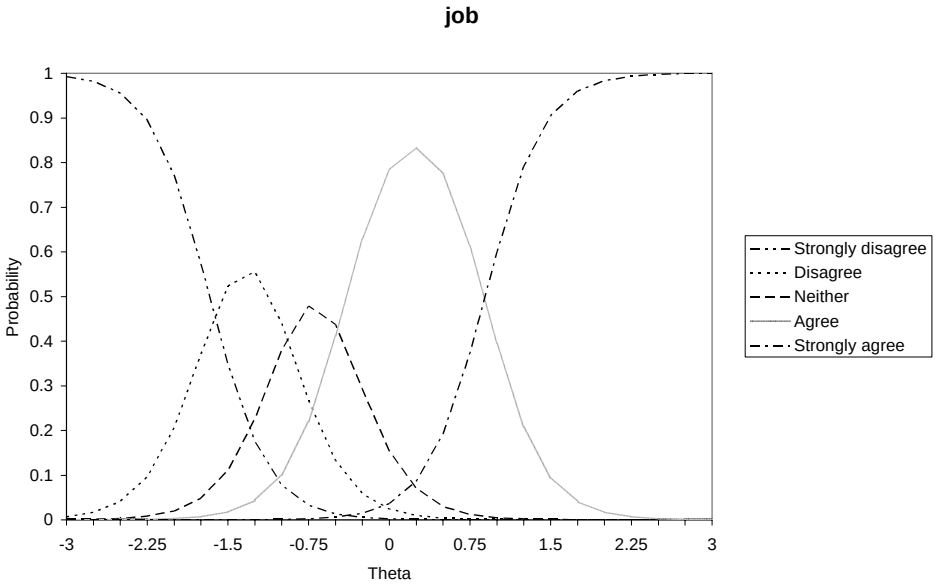

Figure 56. Item characteristic curves for items on Job Security Scale (Q26C: My future in the Navy appears secure as long as I do a good job).

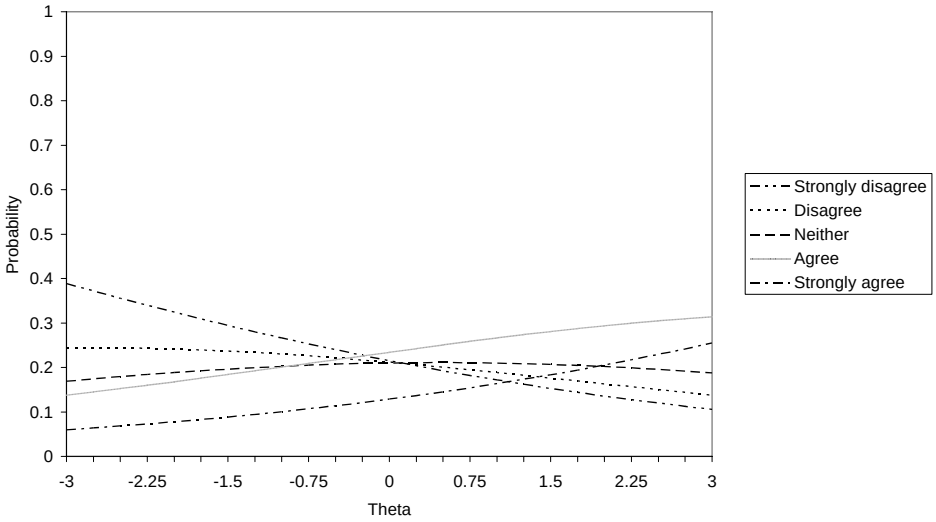

Figure 57. Item characteristic curves for items on Job Security Scale (Q26D: I would be willing to change my rating/designator if it was the only way I could stay in the Navy).

their jobs

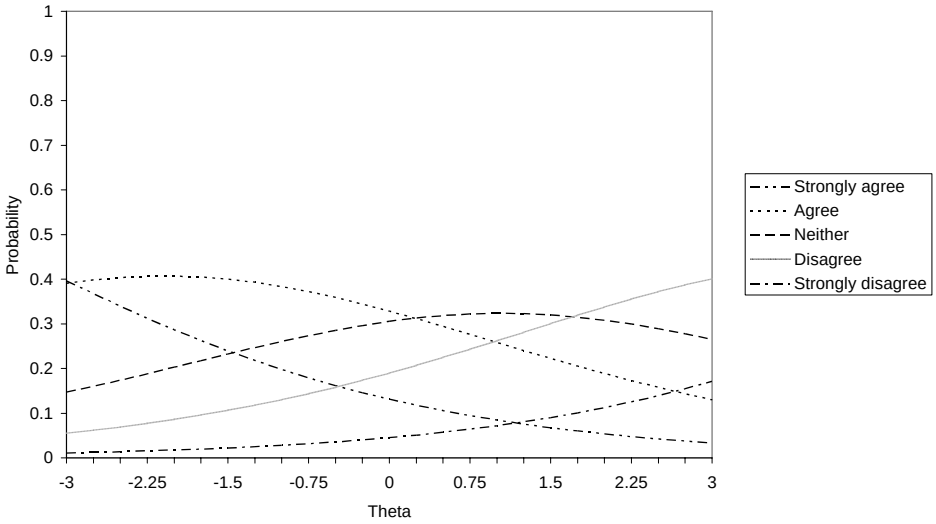

Figure 58. Item characteristic curves for items on Job Security Scale (Q26E: I am concerned that some of my fellow Sailors may soon lose their jobs).

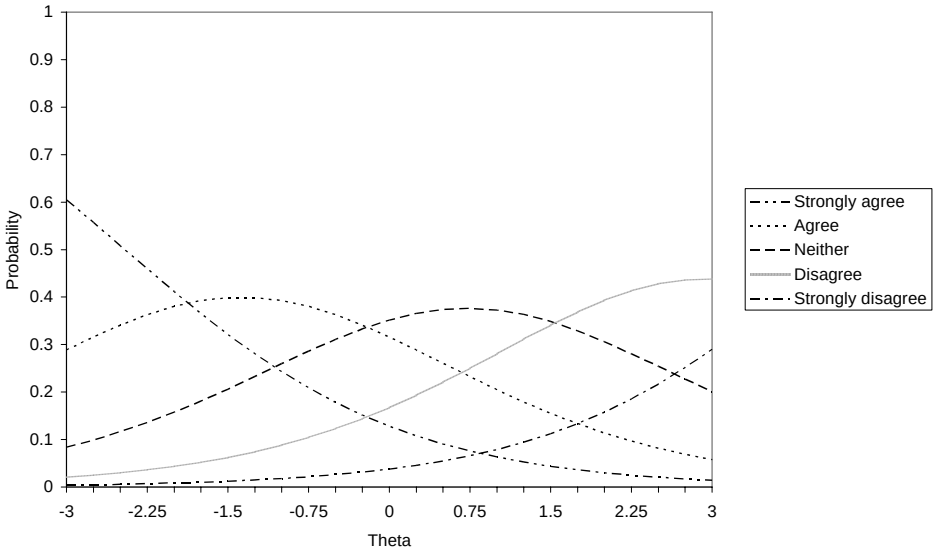

Figure 59. Item characteristic curves for items on Job Security Scale (Q26F: I am concerned that future policy changes will hurt my job).

Fairness

The four items on the Fairness scale performed well (see Table 11). Reviewing the ICCs shows that all four items had steep curves (see Figures 60–63). In addition, the curves for the response options are spread across the continuum of theta with no curve being engulfed by another, indicating that each response option is informative and should be retained.

Table 11
Fairness Scale

Item #	Description	% Agree / Strongly Agree	Factor Loading	IRT Parameters				
				a	b1	b2	b3	b4
Q27A	Navy personnel policies seem fair	57.0	0.72	2.27	-1.99	-1.01	-0.21	1.62
Q27B	Navy policies retain best quality Sailors	40.9	0.78	2.70	-1.37	-0.44	0.24	1.68
Q27C	Trust Navy to look out for my best interests	30.4	0.78	2.73	-1.20	-0.28	0.55	1.95
Q27D	Confident policies affecting size of Navy will be administered fairly and consistently	39.8	0.78	2.85	-1.50	-0.65	0.27	1.87

Notes:
Analyses are unweighted.
Confirmatory factor model fit indices: CFI = 0.99, TLI = 0.98, SRMR = 0.01.

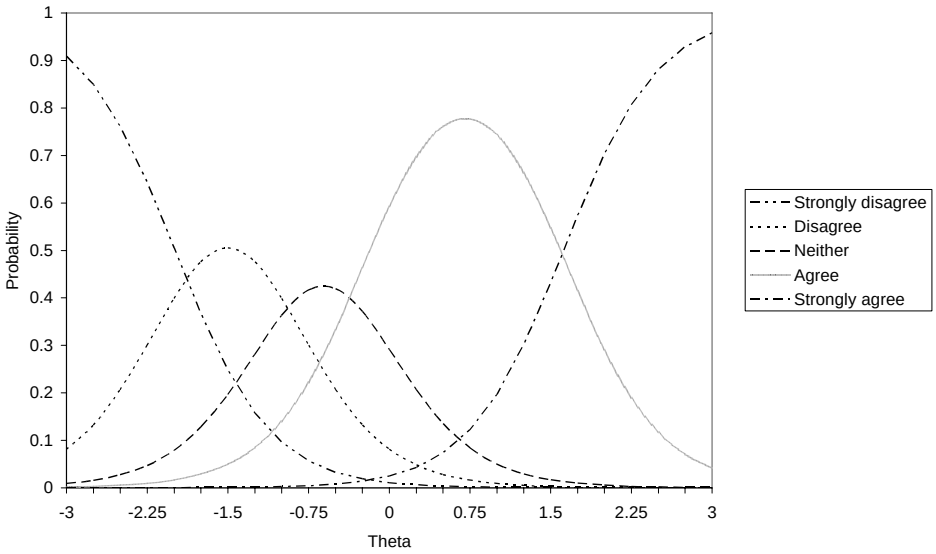

Figure 60. Item characteristic curves for items on Fairness Scale (Q27A: Navy personnel policies seem fair).

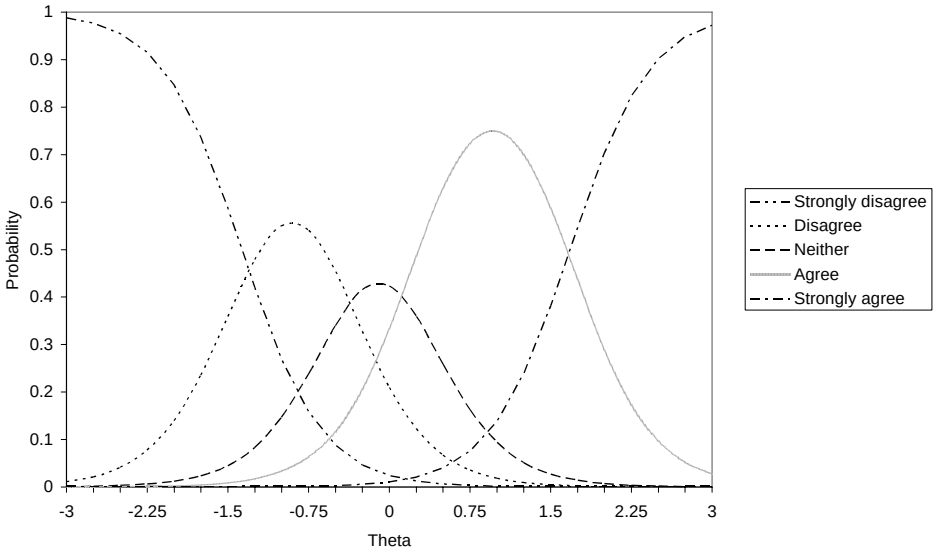

Figure 61. Item characteristic curves for items on Fairness Scale (Q27B: Navy policies retain best quality Sailors).

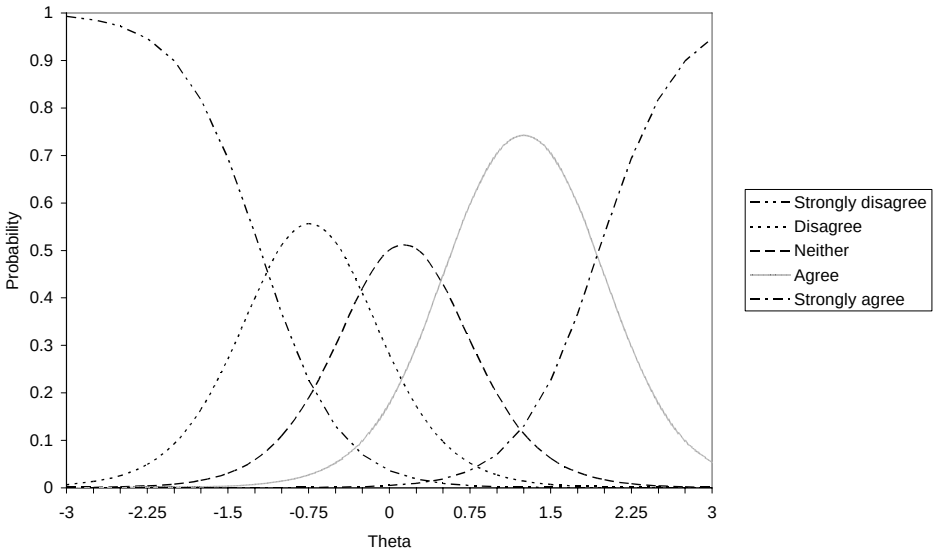

Figure 62. Item characteristic curves for items on Fairness Scale (Q27C: Trust Navy to look out for my best interests).

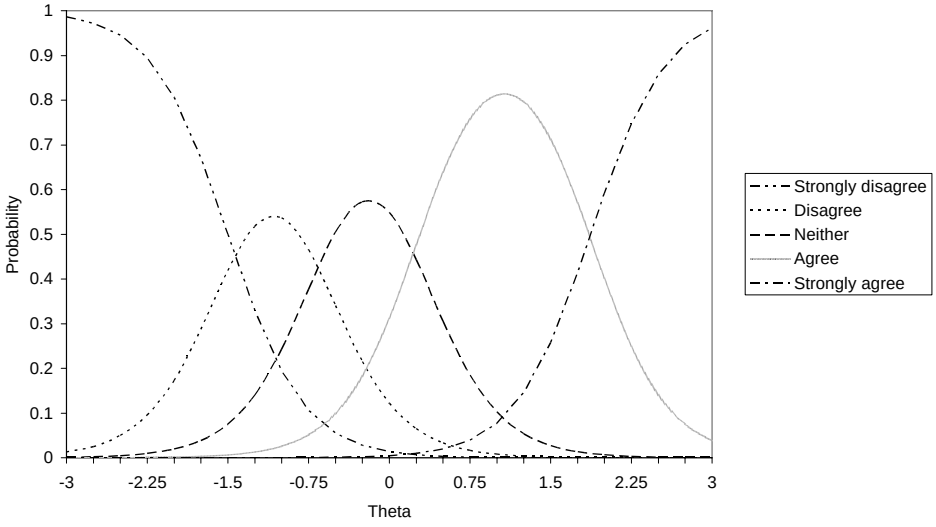

Figure 63. Item characteristic curves for items on Fairness Scale (Q27D: Confident policies affecting size of Navy will be administered fairly and consistently).

Navy Image

Levels of agreement with the items comprising the Navy Image scale range from a low of 36 percent for item Q28F (Comments I hear about the Navy from fellow Sailors are usually positive) to a high of 70 percent for item Q28B (I talk about the Navy to friends as a good organization). Interestingly, the items on this scale also appear to split into two with the first three items (Q28A-C) having very high slopes and factor loadings while the other four items (Q28D-G) have lower slopes and factor loadings (see Table 12). The differences in discrimination between these two sets of items are also reflected in differences in the steepness of their ICCs (see Figures 64–70). However, the last four items do reach acceptable levels of discrimination, suggesting that they may be retained on the scale.

Table 12
Navy Image Scale

Item #	Description	% Agree / Strongly Agree	Factor Loading	IRT Parameters				
				a	b1	b2	b3	b4
Q28A	I would encourage others to join the Navy	60.9	0.90	5.69	-1.29	-0.72	-0.22	0.84
Q28B	I talk about Navy to friends as a good organization	69.7	0.89	5.37	-1.57	-0.99	-0.42	0.77
Q28C	I would recommend the Navy as a good place to work	63.1	0.93	7.39	-1.40	-0.83	-0.26	0.84
Q28D	I would wear civilian clothing with Navy logos	56.9	0.49	1.39	-1.83	-0.89	-0.24	1.43
Q28E	Information I hear about Navy from non-Navy sources is usually positive	55.2	0.50	1.42	-2.72	-1.38	-0.15	2.20
Q28F	Comments I hear about Navy from fellow Sailors are usually positive	35.5	0.64	1.88	-1.63	-0.40	0.48	2.46
Q28G	Navy of tomorrow will be better than today	36.4	0.52	1.35	-2.09	-1.06	0.56	2.19

Notes:
Analyses are unweighted.
Confirmatory factor model fit indices: CFI = 0.96, TLI = 0.94, SRMR = 0.05.

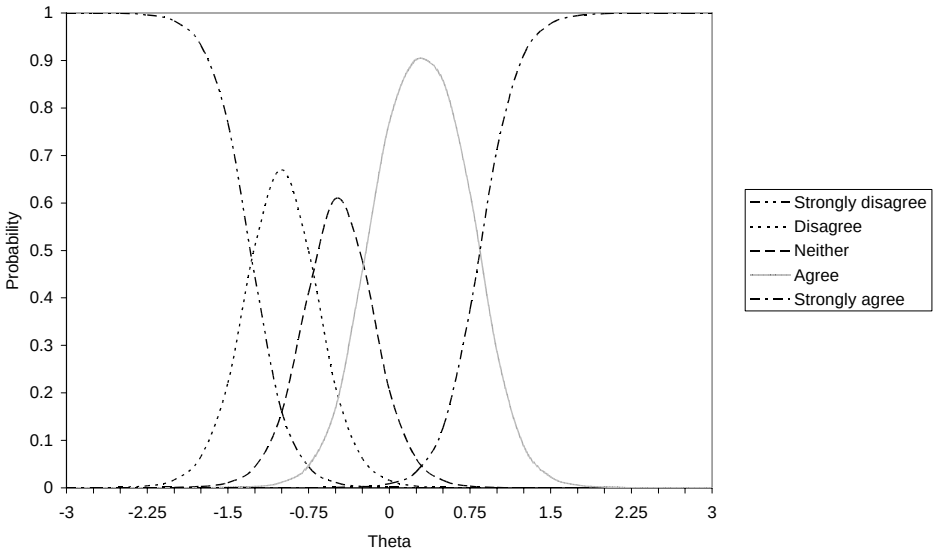

Figure 64. Item characteristic curves for items on Navy Image Scale (Q28A: I would encourage others to join the Navy).

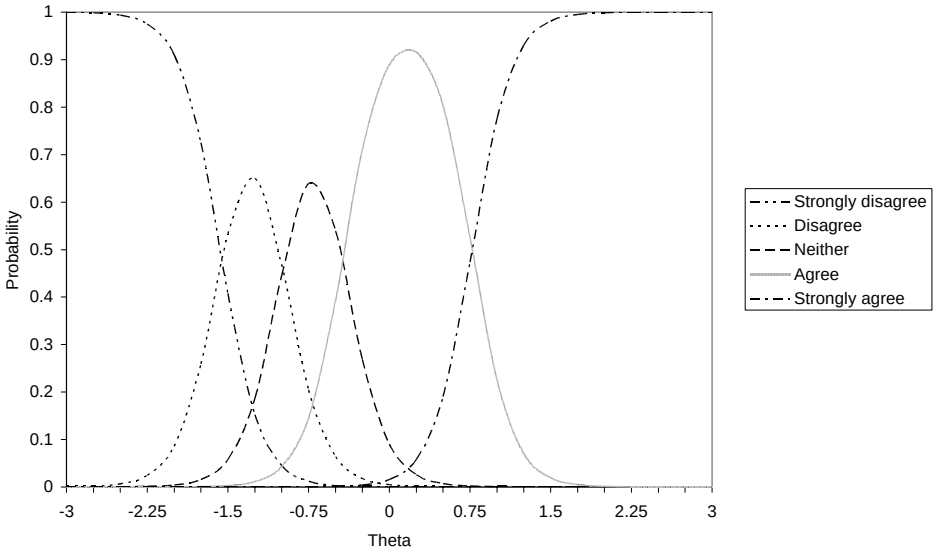

Figure 65. Item characteristic curves for items on Navy Image Scale (Q28B: I talk about Navy to friends as a good organization).

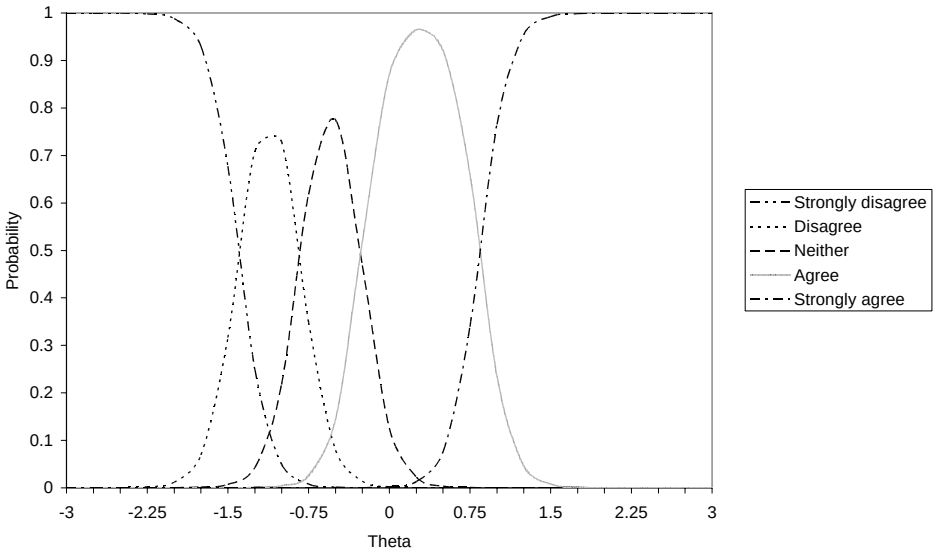

Figure 66. Item characteristic curves for items on Navy Image Scale (Q28C: I would recommend the Navy as a good place to work).

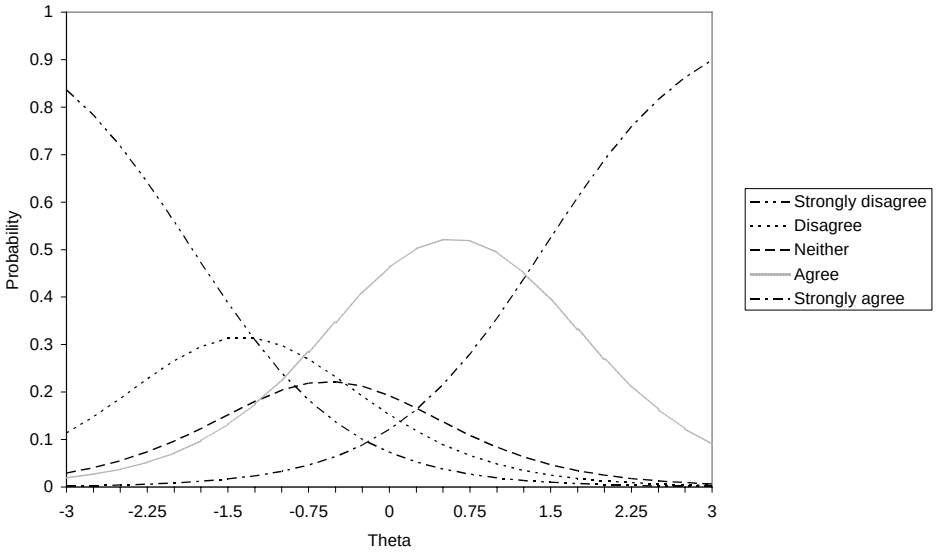

Figure 67. Item characteristic curves for items on Navy Image Scale (Q28D: I would wear civilian clothing with Navy logos).

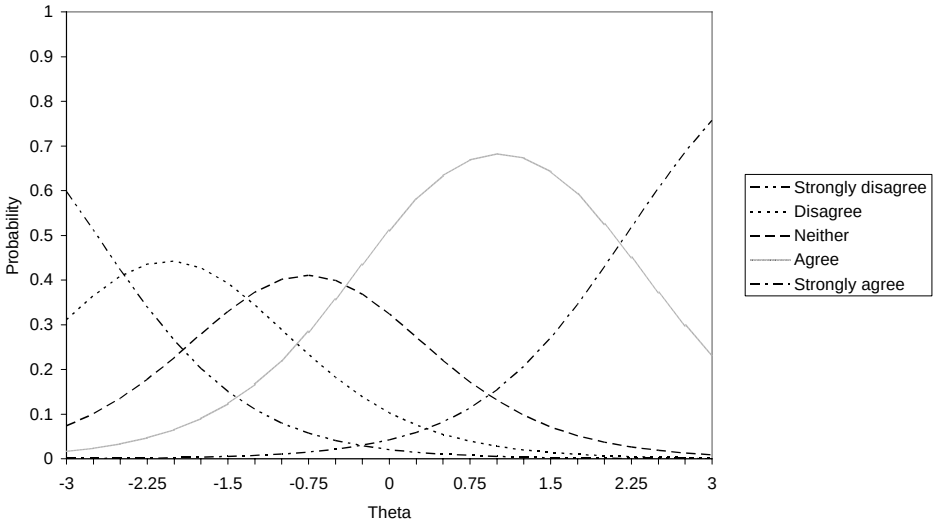

Figure 68. Item characteristic curves for items on Navy Image Scale (Q28E: Information I hear about Navy from non-Navy sources is usually positive).

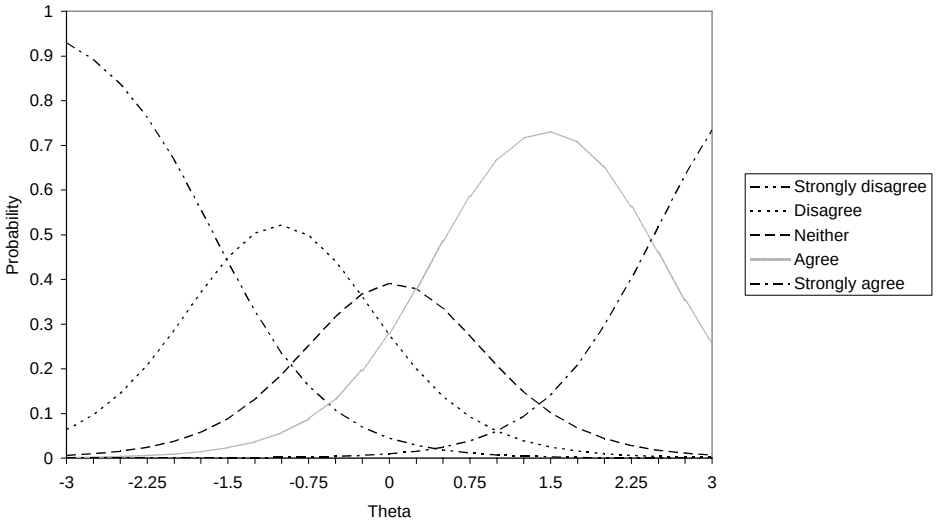

Figure 69. Item characteristic curves for items on Navy Image Scale (Q28F: Information I hear about Navy from fellow Sailors is usually positive).

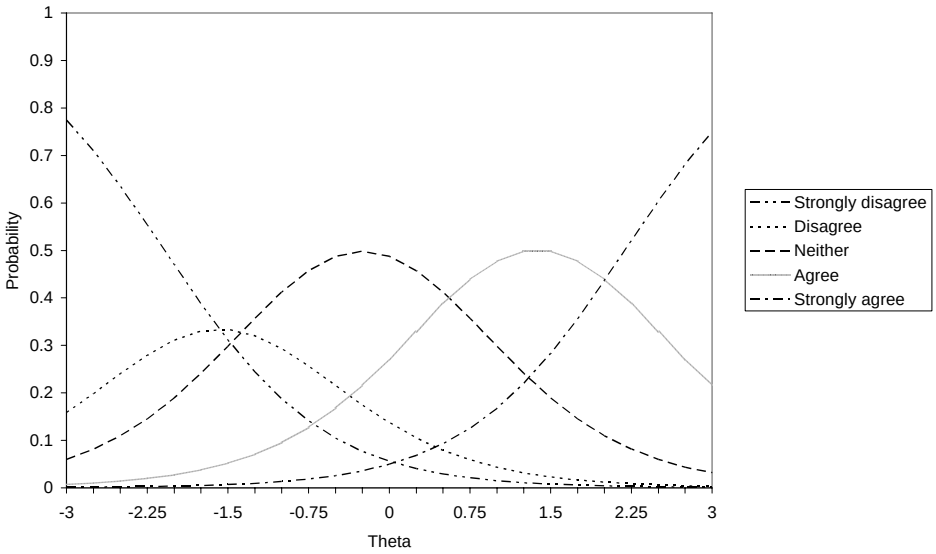

Figure 70. Item characteristic curves for items on Navy Image Scale (Q28G: Navy of tomorrow will be better than today).

Organizational Commitment

The Organizational Commitment scale is comprised of five items shown in Table 13. The items have variation in levels of agreement. Almost three-quarters of respondents indicated that the Navy has personal meaning for them (item Q37A) while only 41 percent indicated that they could not easily become attached to another organization (Q37D). Reviewing the ICCs (see Figures 71–75), factor loadings, and IRT parameters suggests that all five items are effectively able to discriminate between personnel with low vs. high levels of organizational commitment.

Table 13
Organizational Commitment Scale

Item #	Description	% Agree / Strongly Agree	Factor Loading	IRT Parameters				
				a	b1	b2	b3	b4
Q37A	Navy has personal meaning for me	73.1	0.82	3.41	-1.96	-1.27	-0.59	0.51
Q37B	I feel like I'm "part of the family" in the Navy	60.4	0.87	4.11	-1.57	-0.86	-0.24	0.78
Q37C	I feel "emotionally attached" to the Navy	51.9	0.89	4.86	-1.29	-0.66	-0.02	0.87
Q37D	I could not easily become attached to another organization	40.7	0.75	2.52	-1.38	-0.55	0.26	1.18
Q37E	I feel a strong sense of belonging in the Navy	58.3	0.91	5.33	-1.40	-0.81	-0.17	0.81

Notes:
Analyses are unweighted.
Confirmatory factor model fit indices: CFI = 0.99, TLI = 0.98, SRMR = 0.02.

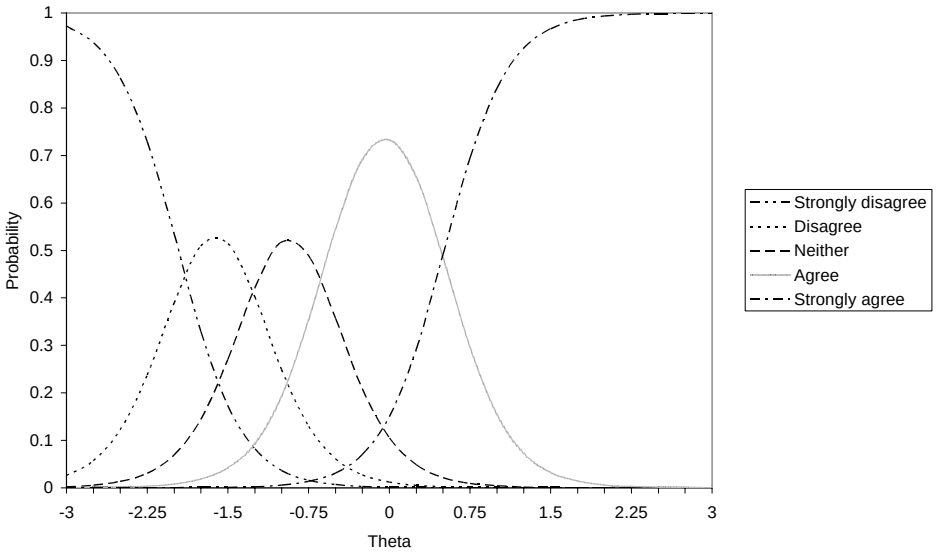

Figure 71. Item characteristic curves for items on Organizational Commitment Scale (Q37A: Navy has personal meaning for me).

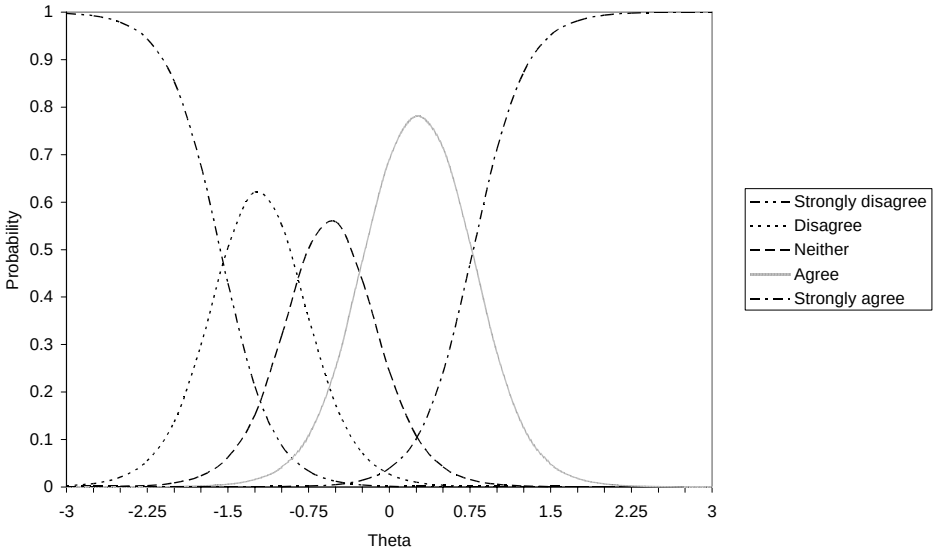

Figure 72. Item characteristic curves for items or Organizational Commitment Scale (Q38B: I feel like I'm part of the family in the Navy.)

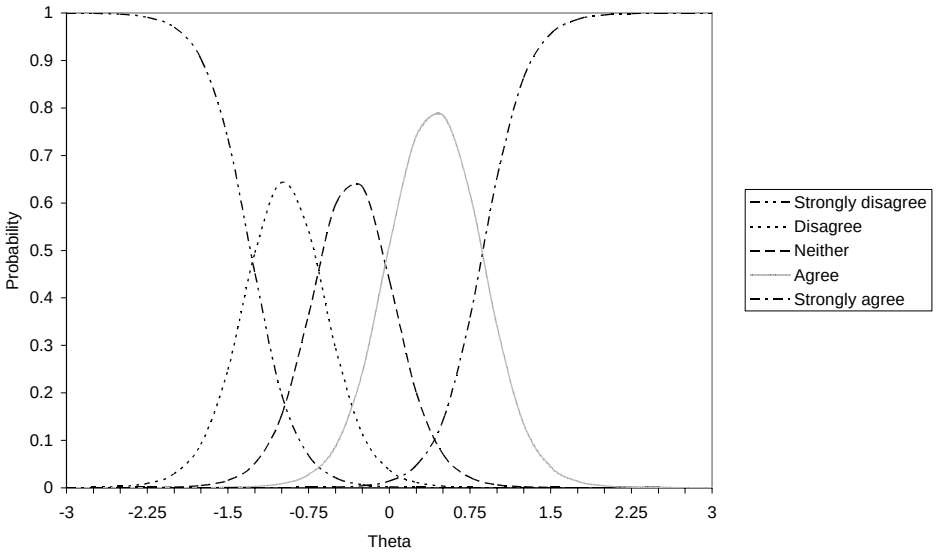

Figure 73. Item characteristic curves for items on Organizational Commitment Scale (Q37C: I feel emotionally attached to the Navy).

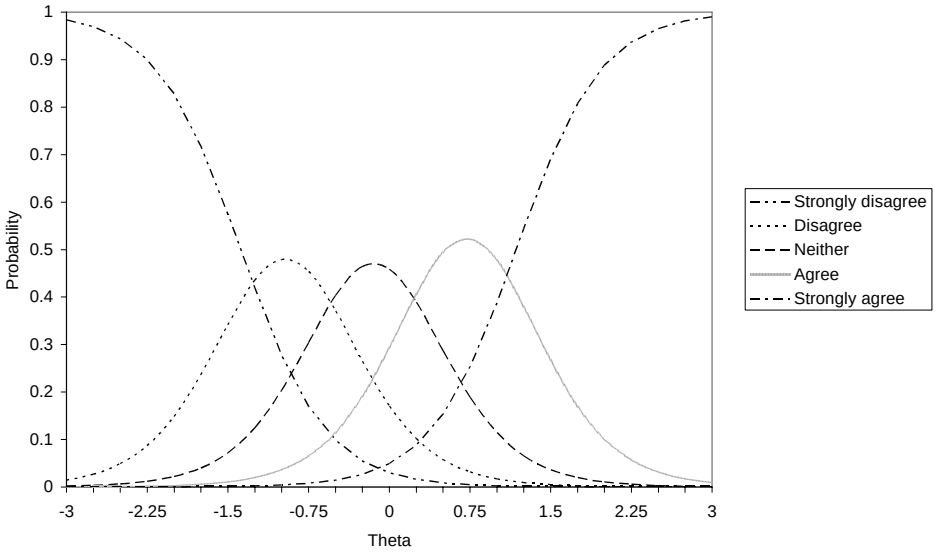

Figure 74. Item characteristic curves for items on Organizational Commitment Scale (Q37D: I could not easily become attached to another organization).

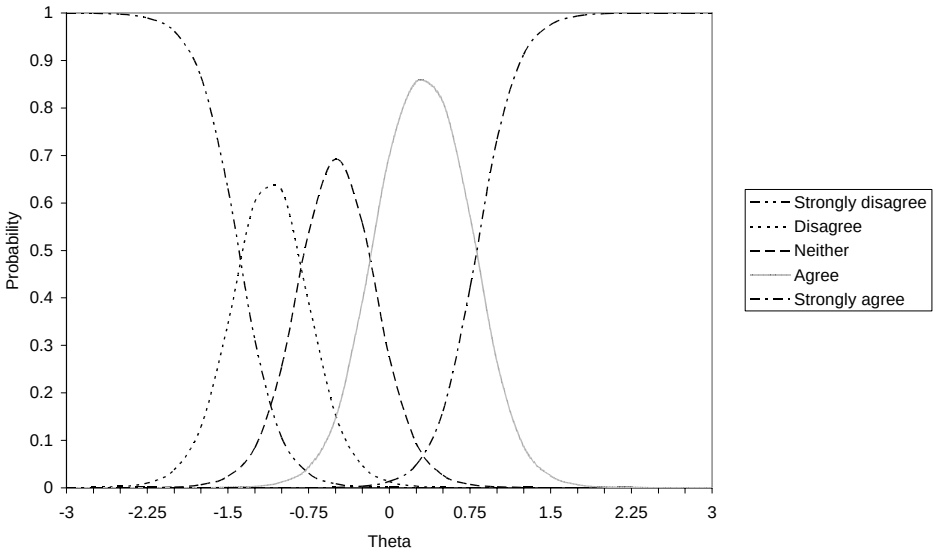

Figure 75. Item characteristic curves for items on Organizational Commitment Scale (Q37E: I feel a strong sense of belonging in the Navy).

Advancement/Promotion

The item-level statistics for the Advancement/Promotion scale are shown in Table 14. The items varied greatly in their levels of agreement. While 82 percent of Sailors indicated that they have a clear understanding of the advancement/promotion system (Q38A), only 34 percent indicated that only the most qualified Sailors get promoted (Q38C). As shown in Figures 76–79, the ICCs for items Q38A (clear understanding of advancement/promotion system) and Q38D (expect to be promoted within current term) were clustered on the lower end of theta. In addition, the curves for item Q38D ("Expect to be promoted within current term") are flatter, suggesting that this item may not be related to the other items on the scale.

Table 14
Advancement/Promotion Scale

Item #	Description	% Agree/ Strongly Agree	Factor Loading	IRT Parameters				
				a	b1	b2	b3	b4
Q38A	Clear understanding of advancement/promotion system	81.7	0.42	0.96	-4.26	-2.60	-1.73	0.93
Q38B	Satisfied with advancement/promotion system	43.4	0.89	4.34	-1.14	-0.32	0.17	1.29
Q38C	The most qualified Sailors get promoted	34.0	0.71	2.23	-1.13	-0.09	0.50	1.75
Q38D	Expect to be promoted within current term	59.9	0.26	0.55	-4.28	-2.60	-0.75	2.02

Notes:
Analyses are unweighted.
Confirmatory factor model fit indices: CFI = 0.99, TLI = 0.98, SRMR = 0.02.

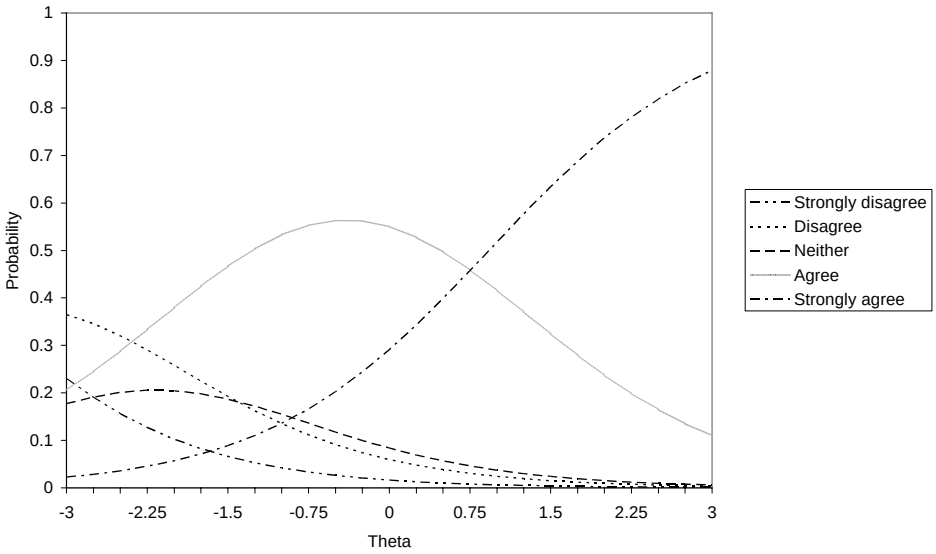

Figure 76. Item characteristic curves for items on Advancement/Promotion Scale (Q38A: Clear understanding of advancement/promotion system).

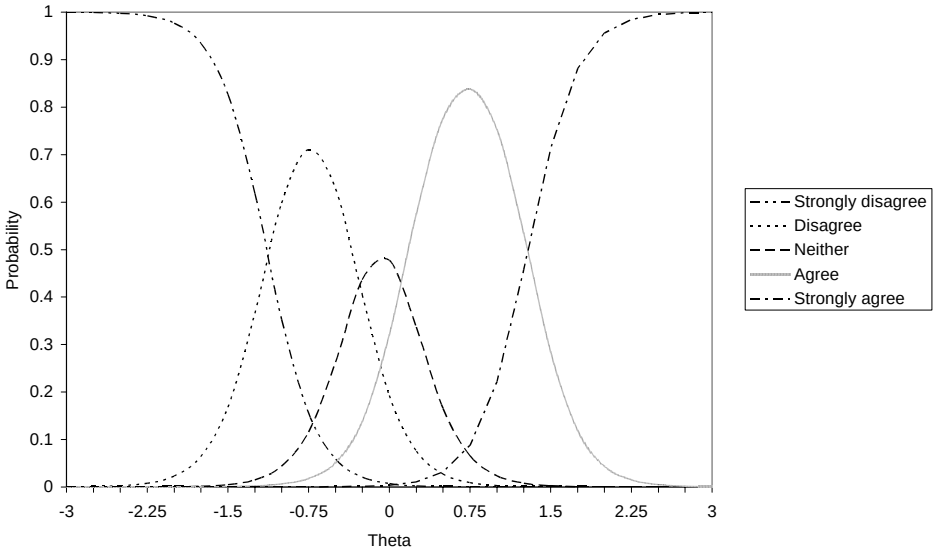

Figure 77. Item characteristic curves for items on Advancement/Promotion System Scale (Q38B: Satisfied with advancement/promotion system).

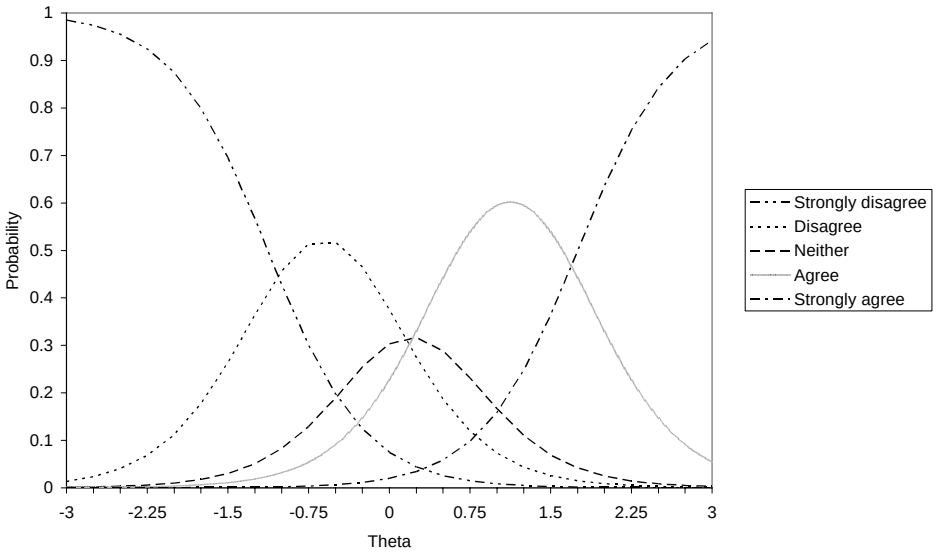

Figure 78. Item characteristic curves for items on Advancement/Promotion Scale (Q38C: The most qualified Sailors get promoted).

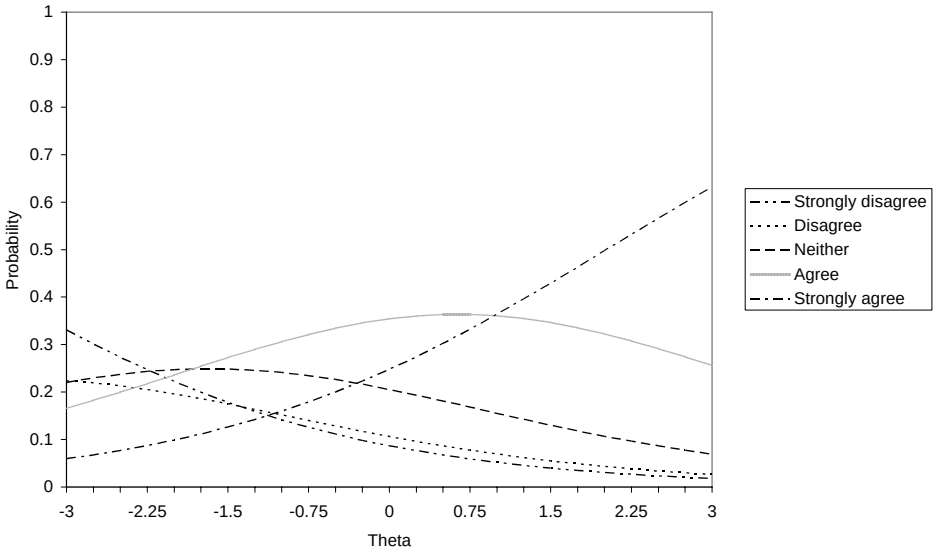

Figure 79. Item characteristic curves for items on Advancement/Promotion Scale (Q38D: Expect to be promoted within current term).

Performance Evaluations/Fitness Reports

NPS respondents were asked seven questions concerning performance evaluations and fitness reports (EVAL/FITREPs). As shown in Table 15 and Figures 80–87, items Q39E (last promotion recommendation was fair) and Q29B (last EVAL/FITREP was fair/accurate) had the highest slopes and factor loadings, suggesting that these items may be salient indicators of respondents' perceptions concerning performance evaluations and fitness reports

Table 15
Performance Evaluations/Fitness Reports Scale

Item #	Description	% Agree/ Strongly Agree	Factor Loading	IRT Parameters				
				a	b1	b2	b3	b4
Q39A	Clear understanding of present system	84.0	0.48	1.45	-3.25	-2.05	-1.40	0.66
Q39B	Last EVAL/FITREP was fair/accurate	71.6	0.86	4.20	-1.53	-1.00	-0.58	0.63
Q39C	Last EVAL/FITREP was conducted in a timely manner	75.9	0.69	2.73	-1.90	-1.27	-0.79	0.69
Q39D	Able to submit input at my last EVAL/FITREP	78.2	0.62	2.18	-2.12	-1.45	-0.91	0.55
Q39E	Last promotion recommendation was fair	72.0	0.84	3.86	-1.64	-1.15	-0.59	0.54
Q39F	Satisfied with present EVAL/FITREP system	52.8	0.59	1.79	-1.75	-0.90	-0.15	1.45
Q39G	Most qualified and deserving Sailors score highest on the EVALs/FITREPs	37.0	0.48	1.21	-1.58	-0.39	0.54	2.29

Notes:
Analyses are unweighted.
Confirmatory factor model fit indices: CFI = 0.96, TLI = 0.93, SRMR = 0.04.
Correlated errors permitted between items Q39F and Q39G.

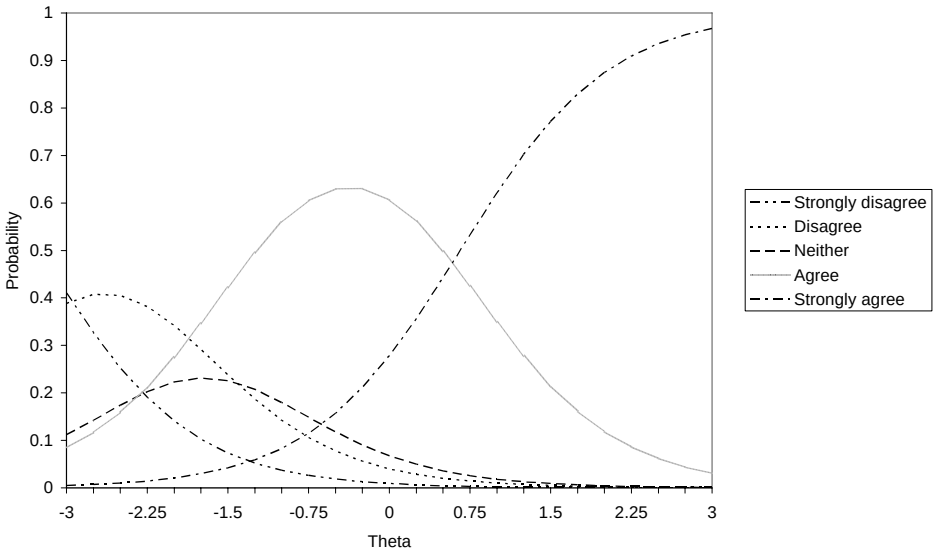

Figure 80. Item characteristic curves for items on Performance Evaluations/ Fitness Reports Scale (Q39A: Clear understanding of present system).

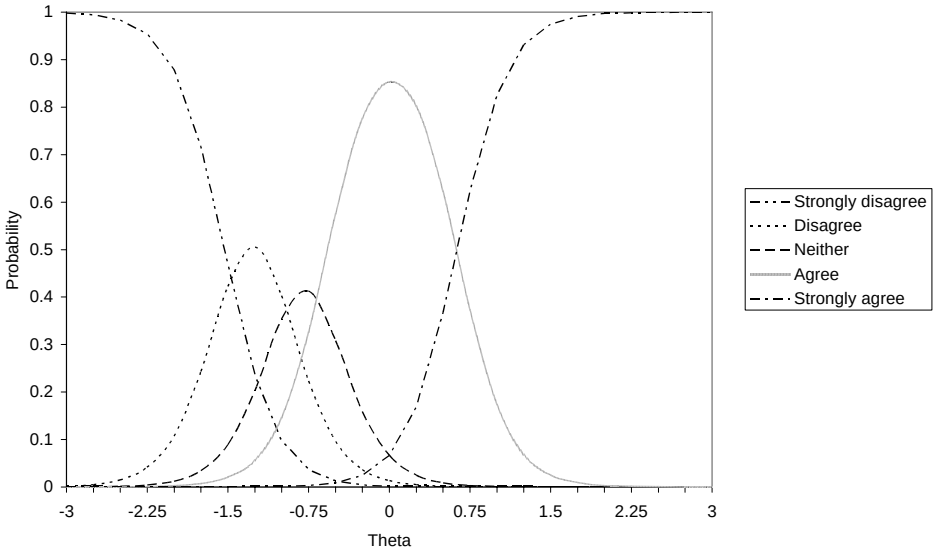

Figure 81. Item characteristic curves for items on Performance Evaluations/ Fitness Reports Scale (Q39B: Last EVAL/FITREP was fair/accurate).

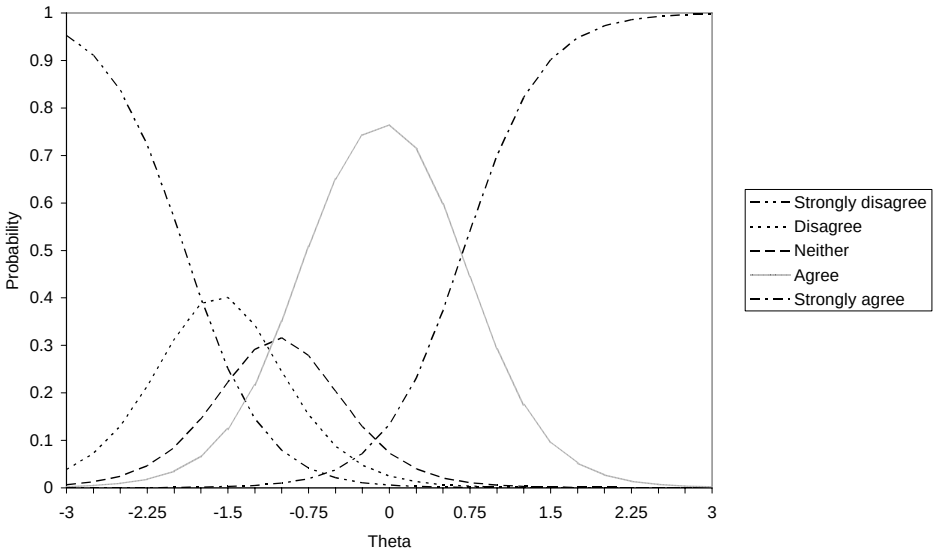

Figure 82. Item characteristic curves for items on Performance Evaluations/ Fitness Reports Scale (Q39C: Last EVAL/FITREP was conducted in a timely manner).

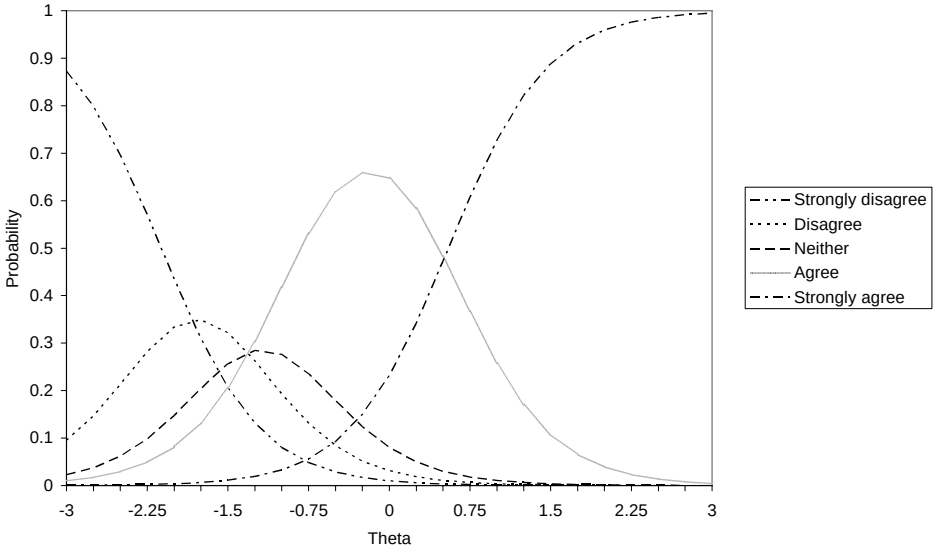

Figure 83. Item characteristic curves for items on Performance Evaluations/ Fitness Reports Scale (Q39D: Able to submit input at my last EVAL/FITREP).

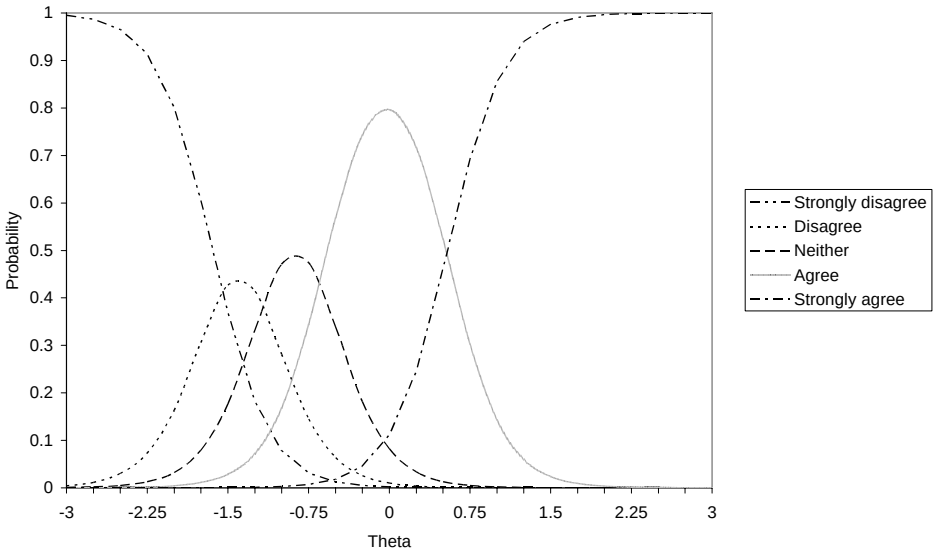

Figure 84. Item characteristic curves for items on Performance Evaluations/ Fitness Reports Scale (Q39E: Last promotion recommendation was fair).

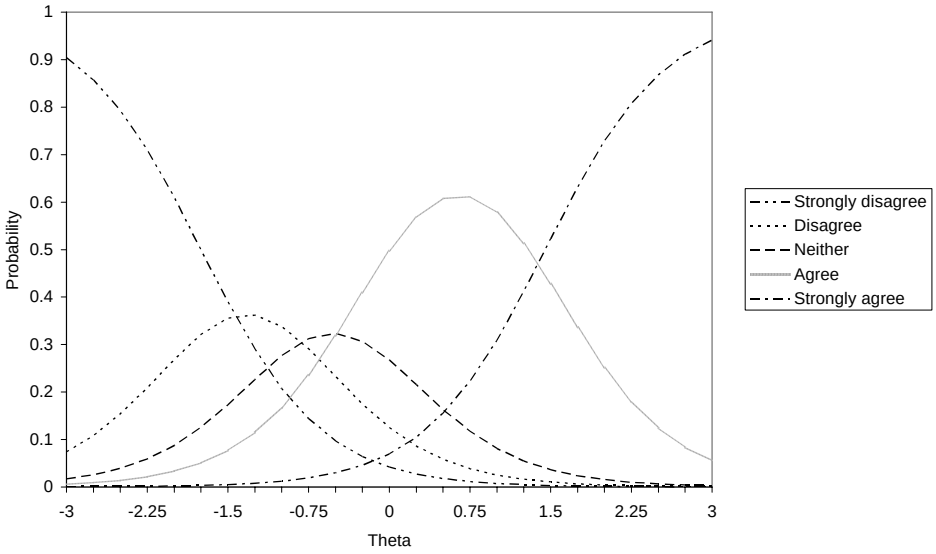

Figure 85. Item characteristic curves for items on performance Evaluations/ Fitness Reports Scale (Q39F: Satisfied with present EVAL/FITREP system).

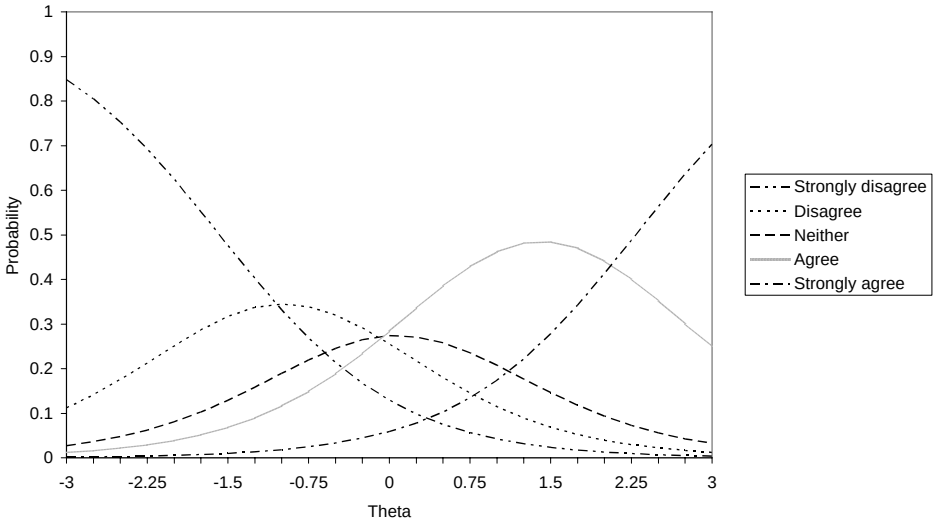

Figure 86. Item characteristic curves for items on performance Evaluations/ Fitness Reports Scale (Q39G: Most qualified and deserving Sailors score highest on the EVALs/FITREPs).

Recognition

The NPS includes two items concerning adequate recognition for accomplishments (see Table 16). Respondents indicated slightly more agreement that they were adequately recognized for accomplishments on EVAL/FITREPs (63% agree/strongly agree) than that they were recognized with awards (50% agree/strongly agree). Both items demonstrated good psychometric properties and had steep ICCs (see Figures 87–88).

Table 16
Recognition Scale

Item #	Description	% Agree / Strongly Agree	Factor Loading	IRT Parameters				
				a	b1	b2	b3	b4
Q40A	Adequately recognized for accomplishments on EVALs/FITREPs	62.5	0.91	3.31	-1.66	-0.89	-0.35	0.89
Q40B	Adequately recognized for accomplishments with awards	49.6	0.91	3.08	-1.36	-0.64	-0.04	1.16

Notes:
Analyses are unweighted.
Due to small number of items, exploratory rather than confirmatory factor analysis was conducted. Factor eigenvalue = 1.65.

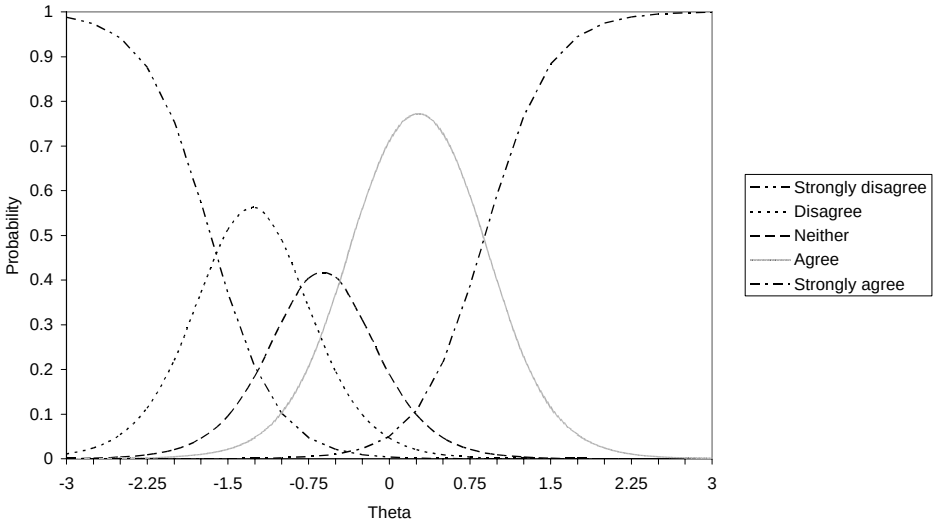

Figure 87. Item characteristic curves for items on Recognition Scale (Q40A: Adequately recognized for accomplishments on EVALs/FITREPs).

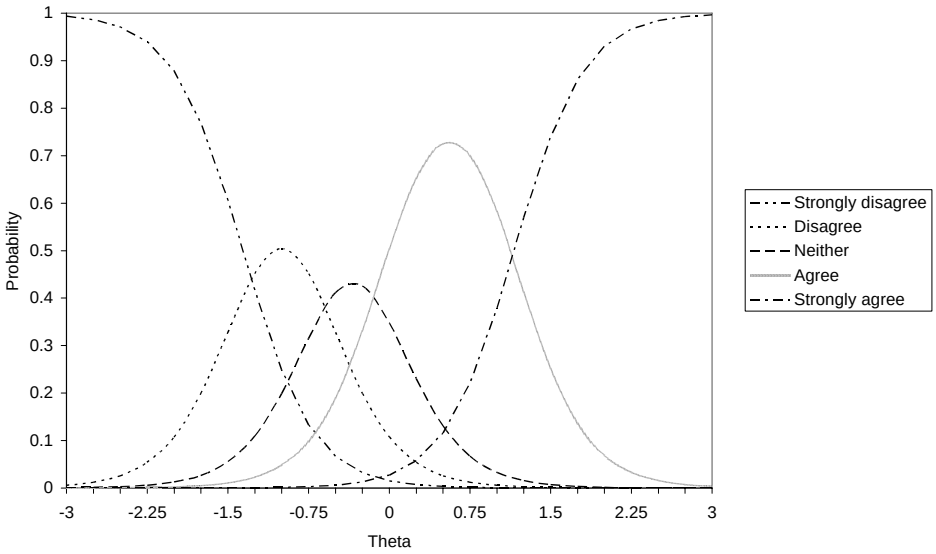

Figure 88. Item characteristic curves for items on Recognition Scale (Q40B: Adequately recognized for accomplishments with awards).

Career Development

The four-item Career Development scale is shown in Table 17. While all four items had slopes with a value of at least one, the two items concerning counseling and guidance (items Q41C and Q41D) had noticeably higher slopes with values of 4.79 and 3.96, respectively (see Figures 89–92). In contrast, the slopes for items Q41A and Q41C were 1.35 and 1.16, respectively. This differential in slopes suggests that perhaps these items may be split into two scales.

Table 17
Career Development Scale

Item #	Description	% Agree / Strongly Agree	Factor Loading	IRT Parameters				
				a	b1	b2	b3	b4
Q41A	Clearly defined path for my designator, rating, or community	63.7	0.52	1.35	-2.55	-1.45	-0.54	1.38
Q41B	Sufficient progress in my advancement	69.9	0.45	1.16	-3.30	-2.01	-0.87	1.31
Q41C	Given adequate counseling/guidance by my immediate supervisor	48.4	0.90	4.79	-1.34	-0.64	0.02	1.23
Q41D	Given adequate counseling/guidance by my career counselor	44.7	0.86	3.96	-1.27	-0.61	0.11	1.32

Notes:
Analyses are unweighted.
Confirmatory factor model fit indices: CFI = 0.88, TLI = 0.64, and SRMR = 0.10.

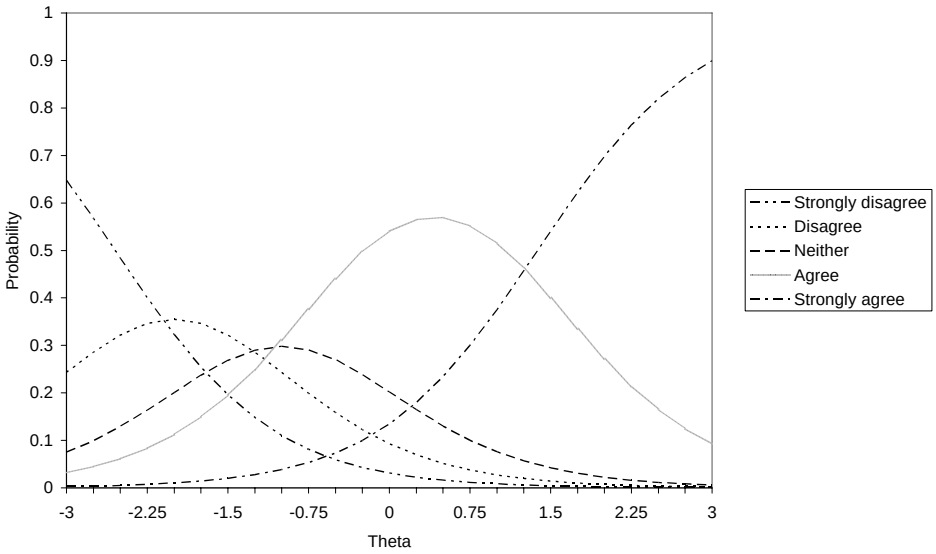

Figure 89. Item characteristic curves for items on Career Development Scale (Q41A: Clearly defined path for my designator, rating, or community).

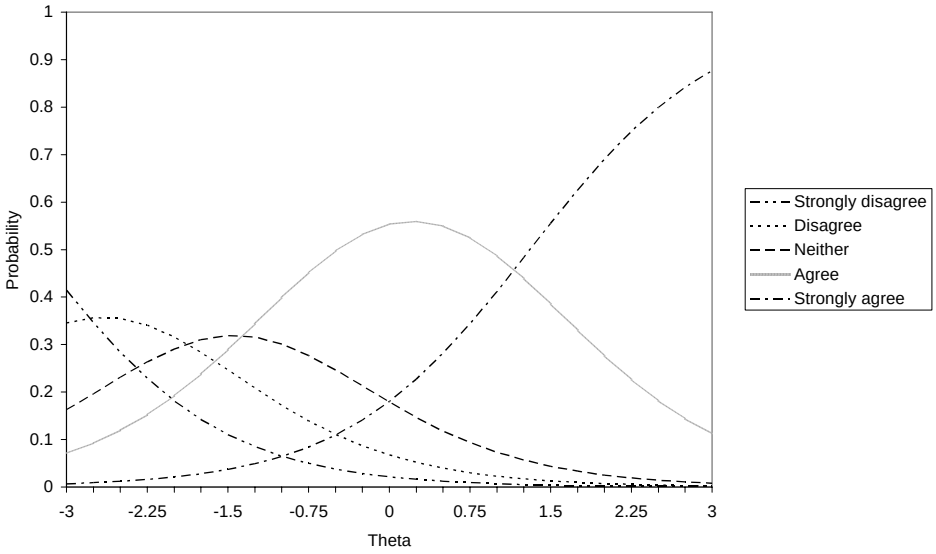

Figure 90. Item characteristic curves for items on Career Development Scale (Q41B: Sufficient progress in my advancement).

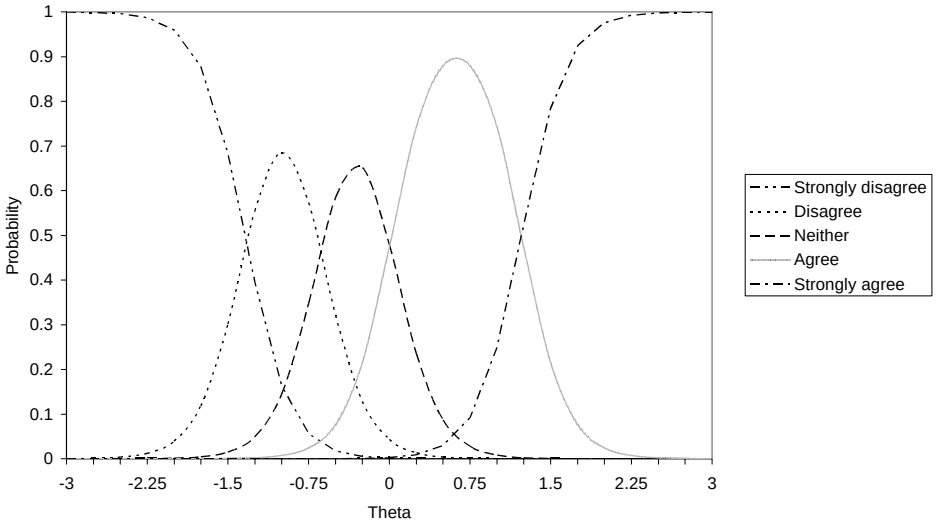

Figure 91. Item characteristic curves for items on Career Development Scale (Q41C: Given adequate counseling/guidance by my immediate supervisor).

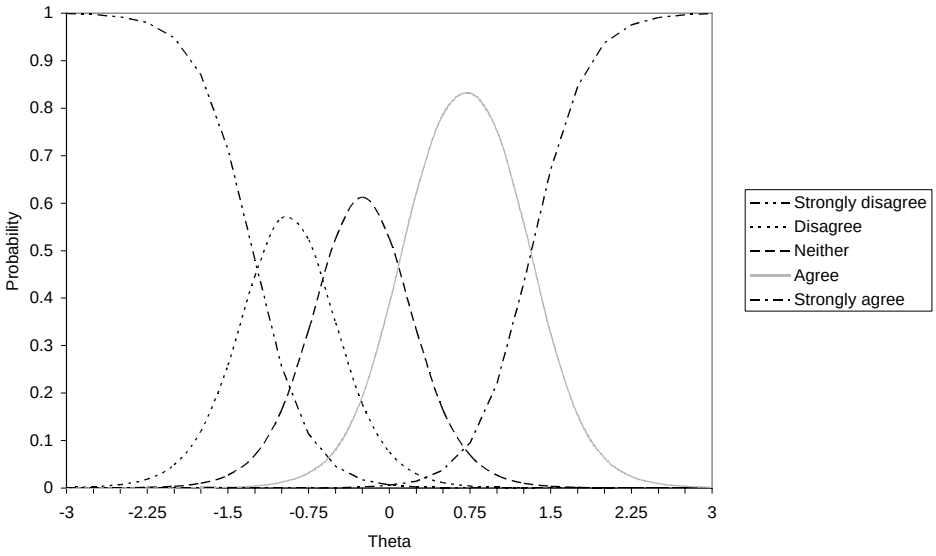

Figure 92. Item characteristic curves for items on Career Development Scale (Q41D: Given adequate counseling/guidance by my career counselor).

Detailing

The final scale is the 7-item Detailing scale shown in Table 18. Percentages of respondents indicating that they agreed or strongly agreed with the items ranged from 36 percent for item Q42D (detailer is an advocate for my needs/desires) to 61 percent for item Q42G (satisfied with current assignment). Similar to the Immediate Supervisor and Command Leadership scales, the overall rating item, Q42F (satisfied with my detailer) had the highest level of discrimination (a=7.57). In contrast, item Q42G (satisfied with current assignment) had a much lower slope (a=1.10) and, correspondingly, had flatter ICCs (see Figures 93–98).

Table 18
Detailing Scale

Item #	Description	% Agree / Strongly Agree	Factor Loading	IRT Parameters				
				a	b1	b2	b3	b4
Q42A	Satisfied with detailing process	45.2	0.77	2.68	-1.47	-0.69	0.14	1.77
Q42B	Clear understanding of detailing process	55.4	0.53	1.48	-2.31	-1.03	-0.14	1.75
Q42C	Detailer responds in a timely manner	48.3	0.82	3.36	-1.53	-0.92	0.05	1.24
Q42D	Detailer is an advocate for my needs/desires	35.5	0.91	5.18	-1.23	-0.65	0.36	1.44
Q42E	Detailer is receptive to resolving conflicts	38.7	0.92	5.62	-1.32	-0.79	0.28	1.46
Q42F	Satisfied with my detailer	43.7	0.94	7.57	-1.29	-0.85	0.14	1.24
Q42G	Satisfied with current assignment	60.9	0.44	1.10	-2.39	-1.57	-0.46	1.44

Notes:
Analyses are unweighted.
Confirmatory factor model fit indices: CFI = 0.97, TLI = 0.96, and SRMR = 0.03.

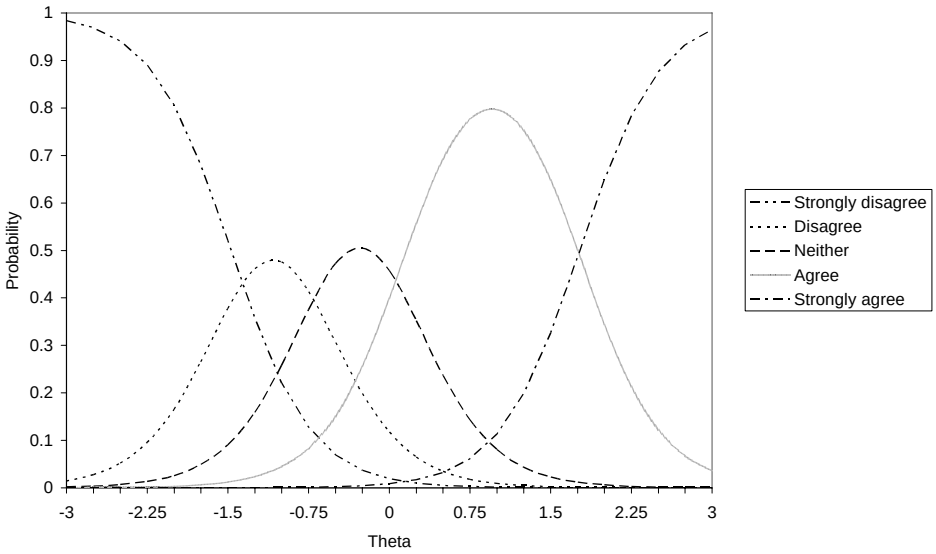

Figure 93. Item characteristic curves for items on Detailing Scale (Q42A: Satisfied with detailing process).

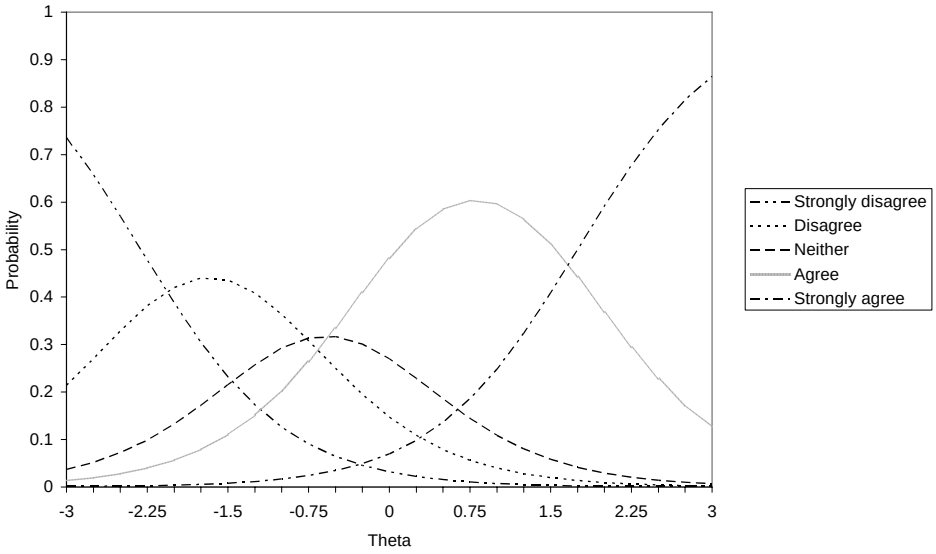

Figure 94. Item characteristic curves for items on Detailing Scale (Q42B: Clear understanding of detailing process).

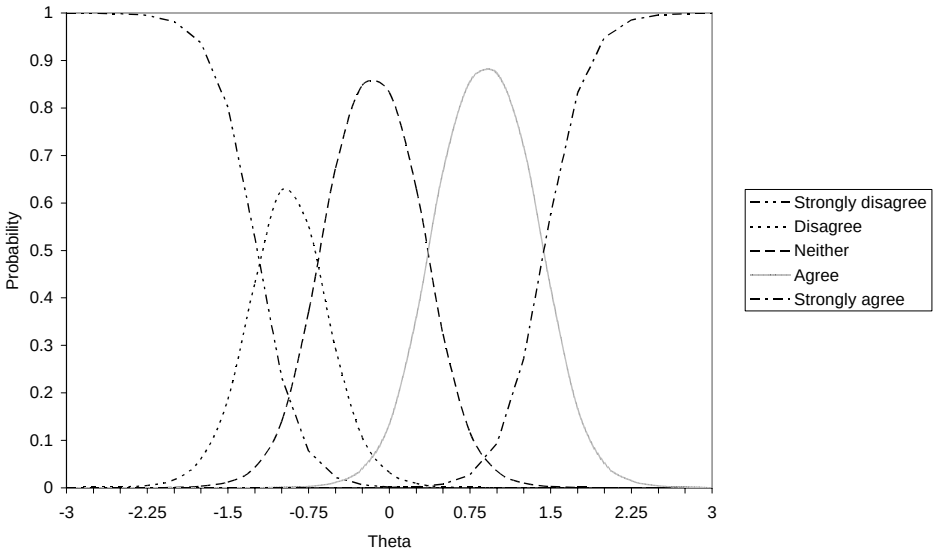

Figure 95. Item characteristic curves for items on Detailing Scale (Q42D: Detailer is an advocate for my needs/desires).

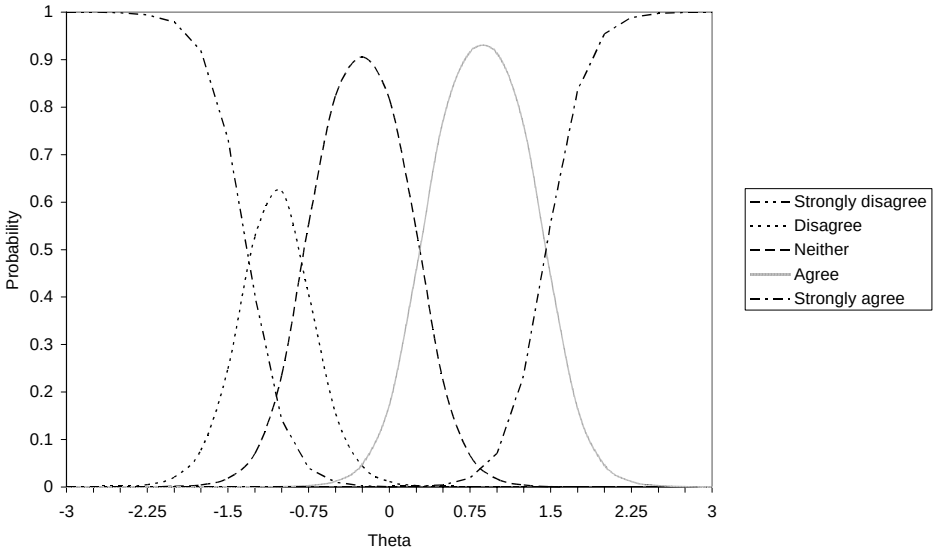

Figure 96. Item characteristic curves for items on Detailing Scale (Q42E: Detailer is receptive to resolving conflicts).

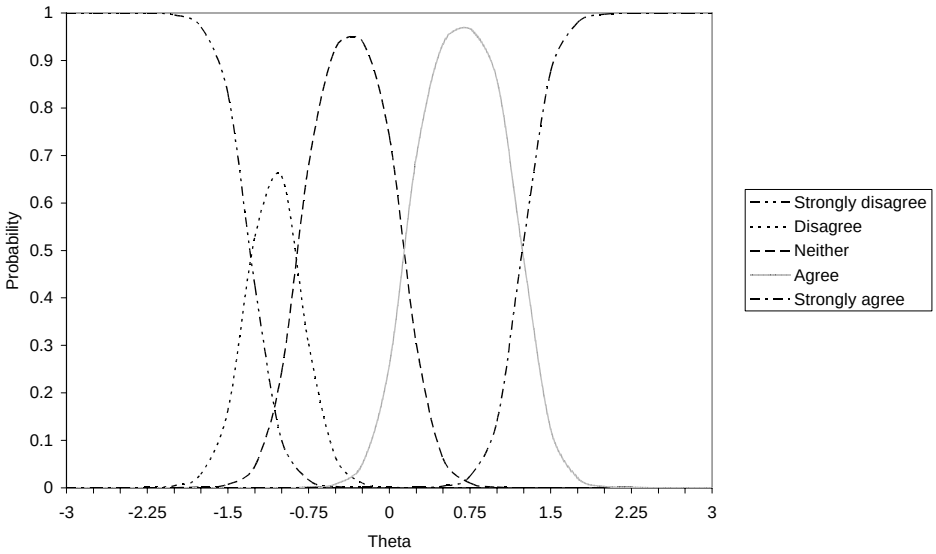

Figure 97. Item characteristic curves for items on Detailing Scale (Q42F: Satisfied with my detailer).

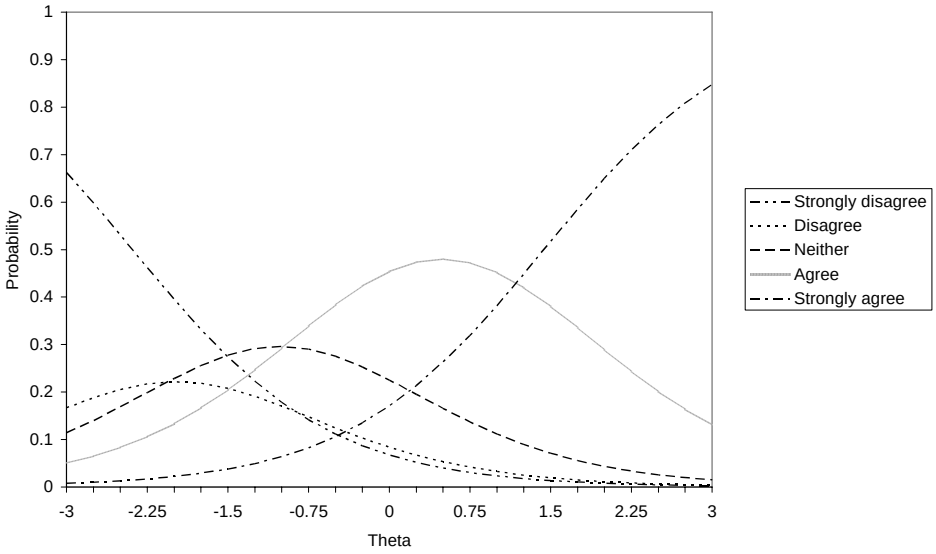

Figure 98. Item characteristic curves for items on Detailing Scale (Q42G: Satisfied with current assignment).

Revised Scales

Based on the analyses of the existing scales, the following six scales were identified which may be revised to improve their psychometric properties: (1) workplace climate, (2) communication, (3) job security, (4) advancement/promotion, (5) career development, and (6) detailing. Revisions are proposed to each of these scales and the psychometric properties of the revised scales are evaluated.

The reliability and validity of the final set of scales were then evaluated, including the six revised scales and the 12 original scales**.** Reliability is the consistency of a scale across repeated measurements. One measure of reliability is the internal consistency of the scale or how related the items on the scale are to each other. Cronbach's alphas was used to assess the internal consistency reliability of the NPS scales (Cronbach, 1951). A common rule of thumb is to require an alpha of 0.70 or higher for group level comparisons and an alpha of 0.90 or higher for individual-level decisions.

Validity is generally described as the extent to which a scale measures what it is designed to measure. To assess the construct validity of the scales, scale scores for groups that should vary on the construct being measured were compared. Specifically, analyses of variance was conducted to compare mean scores for groups classified according to their responses to the following items:

- Q9: How would you rate the overall morale of your present command?
- Q11: Considering everything, how satisfied are you with your Navy job?
- Q29A: How would you rate Navy tone?
- Q65: Considering everything, how satisfied are you with Navy life?

It is hypothesized that Sailors with the following characteristics would have higher scores (i.e., more positive responses) on each of the scales:

- Higher morale,
- Greater job satisfaction,
- Higher ratings of Navy tone, and
- Greater satisfaction with Navy life.

Revised Workplace Climate Scale

Based on the item analyses described in the Workplace Climate Section, it is recommend that item Q13H (Availability of parts and supplies) be removed from the Workplace Climate scale. This item had a low slope parameter. It also seems to differ from the other items in terms of content. While the other items on the scale address more motivational or interpersonal characteristics of climate (e.g., Q13D: Opportunity for personal growth and development), this item concerns more tangible, concrete items (parts and supplies). However, because the item appears to be a salient concern for

Sailors as demonstrated by the 45 percent agreement rate, it is recommend that the item be retained on the survey and analyzed separately from the other items addressing Workplace Climate.

To evaluate the revised Workplace Climate scale, a 1-factor confirmatory factor model was analyzed. As shown in Table 19, this model fit well. With the removal of item Q13H, all of the Workplace Climate items now have acceptable properties.

Table 19
Revised Workplace Climate Scale

Item #	Description	% Agree / Strongly Agree	Factor Loading	IRT Parameters				
				a	b1	b2	b3	b4
Q13A	Amount of freedom I am given to do my job	75.1	0.66	2.19	-2.36	-1.29	-0.77	0.70
Q13B	Amount of responsibility I have in my job	77.8	0.72	3.28	-2.18	-1.30	-0.77	0.57
Q13C	Amount of challenge in my job	72.4	0.80	3.37	-1.91	-1.13	-0.59	0.66
Q13D	Opportunity for personal growth and development on the job	64.3	0.82	2.97	-1.76	-0.91	-0.38	0.87
Q13E	Feeling of accomplishment I get from doing my job	67.9	0.80	2.87	-1.76	-1.01	-0.47	0.74
Q13F	Job security	76.8	0.51	1.36	-3.07	-2.15	-1.09	0.68
Q13G	Physical working conditions of my work site	73.4	0.49	1.37	-3.12	-1.81	-0.94	1.16
Q13I	Flexibility in dealing with family/personal issues	71.1	0.51	1.26	-2.70	-1.81	-0.83	0.82

Notes:
Analyses are unweighted.
Confirmatory factor model fit indices: CFI = 0.95, TLI = 0.92, SRMR = 0.05.
Correlated errors permitted between items Q13A, Q13B, and Q13C.

Revised Communication Scale

Similar to the Workplace Climate scale, the Communication scale contained one item that did not fit well with the other items. As described in the Communications Section, item Q25F (heard rumors about new policies) had very low levels of discrimination ability (a=0.28). This item also appears to be different from the others on the scale in terms of content. While items Q25A–E concern communication from Navy leadership, item Q25F may involve communication from informal sources, such as shipmates or co-workers.

Item Q25F was removed and the analysis was conducted for the revised Communication scale. As shown in Table 20, the remaining items grouped into one factor. All of the items on the revised scale had high factor loadings and slopes, and a spread of threshold parameters.

Table 20
Revised Communication Scale

Item #	Description	% Agree / Strongly Agree	Factor Loading	IRT Parameters				
				a	b1	b2	b3	b4
Q25A	Navy clearly communicates goals and strategies	59.1	0.49	1.77	-2.57	-1.10	-0.33	1.82
Q25B	Senior leadership keeps Sailors informed	60.2	0.65	2.58	-2.11	-0.95	-0.32	1.58
Q25C	Command leadership communicates positive attitude about Navy	72.3	0.66	1.87	-2.57	-1.64	-0.77	1.08
Q25D	Command leadership keeps me informed of Navy policies	66.8	0.86	3.16	-2.14	-1.16	-0.49	1.14
Q25E	Someone in chain of command talked about new career initiatives	49.9	0.65	1.74	-1.67	-0.58	-0.03	1.53

Notes:
Analyses are unweighted.
Confirmatory factor model fit indices: CFI = 1.00, TLI = 1.00, SRMR = 0.01.
Correlated errors permitted between items Q25A and Q25B.

Revised Job Security Scale

Based on the item analyses of the Job Security scale, it is recommended that items Q26D-F be removed from the Job Security scale. These items demonstrated poor discrimination based on their IRT slopes. As shown in Table 21, removal of these items results in a brief scale containing only items with high levels of discrimination.

Table 21
Revised Job Security Scale

Item #	Description	% Agree / Strongly Agree	Factor Loading	IRT Parameters				
				a	b1	b2	b3	b4
Q26A	Feel positive about future Navy career	56.6	0.84	2.24	-1.74	-0.84	-0.21	1.11
Q26B	Navy is doing all it can to protect my job security	44.6	0.87	2.84	-1.67	-0.77	0.12	1.42
Q26C	Future in Navy appears secure	65.6	0.89	4.14	-1.62	-0.96	-0.41	0.87

Notes:
Analyses are unweighted.
Due to small number of items, exploratory rather than confirmatory factor analysis was conducted. Factor eigenvalue = 2.25.

Revised Advancement/Promotion Scale

The original Advancement/Promotion scale contains four items shown in Table 22. Of these four items, one item, Q38D (expect to be promoted within current term) appeared to be unrelated to the others based on its low factor loading (loading=0.26) and slope (a=0.55). While items Q38A–C address understanding of and satisfaction of the advancement and promotion system, item Q38D relates to personal achievement or expectations. Therefore, it is recommended that this item be removed from the scale. The item-level statistics for a revised Advancement/Promotion scale, excluding item Q38D, are shown in Table 22.

Table 22
Revised Advancement/Promotion Scale

Item #	Description	% Agree/ Strongly Agree	Factor Loading	IRT Parameters				
				a	b1	b2	b3	b4
Q38A	Clear understanding of advancement/promotion system	81.7	0.64	0.95	-4.29	-2.62	-1.74	0.94
Q38B	Satisfied with advancement/promotion system	43.4	0.88	4.89	-1.12	-0.32	0.16	1.27
Q38C	The most qualified Sailors get promoted	34.0	0.84	2.13	-1.15	-0.09	0.52	1.78

Notes:
Analyses are unweighted.
Due to small number of items, exploratory, rather than confirmatory, factor analyses were conducted. Factor eigenvalue = 1.88.

Revised Career Development Scales

As described earlier, the pattern of slopes and factor loadings for this scale seem to suggest that the items may be measuring two different constructs and could be divided into separate scales. A 2-factor confirmatory factor model was tested for which items Q41A and Q41B load on one factor, which is referred to as Career Progression and items Q41C and Q41D load on another factor, referred to as Counseling/Guidance. As shown in Table 23, the two-factor model fit well and all of the items have high slopes and loadings on their respective scales.

Table 23
Revised Career Development Scales

Item #	Description	% Agree / Strongly Agree	Factor Loading	IRT Parameters				
				a	b1	b2	b3	b4
Factor 1	**Career progression**							
Q41A	Clearly defined path for my designator, rating, or community	63.7	0.80	2.14	-2.02	-1.21	-0.49	1.09
Q41B	Sufficient progress in my advancement	69.9	0.67	2.94	-2.09	-1.34	-0.62	0.85
Factor 2	**Counseling / guidance**							
Q41C	Given adequate counseling/ guidance by my immediate supervisor	48.4	0.91	3.80	-1.44	-0.66	0.04	1.28
Q41D	Given adequate counseling/ guidance by my career counselor	44.7	0.86	5.56	-1.24	-0.59	0.14	1.26

Notes:
Analyses are unweighted.
Fit indices for two-factor confirmatory factor model: CFI = 1.00, TLI = 0.99, and SRMR = 0.01.

Revised Detailing Scale

Our final set of revisions concerns the Detailing scale. As described earlier, it appeared that item Q42G (satisfied with current assignment) was less discriminating than the other items based on its lower IRT slope (slope=1.10) and flatter ICCs. Furthermore, in contrast to the other items on the scale, this item is not specifically related to detailing. Item Q42G was removed and the IRT and confirmatory factor analyses were rerun. As shown in Table 24, the six remaining items on the scale have high factor loadings and IRT slopes, indicating good discrimination.

Table 24
Revised Detailing Scale

Item #	Description	% Agree / Strongly Agree	Factor Loading	IRT Parameters				
				a	b1	b2	b3	b4
Q42A	Satisfied with detailing process	45.2	0.76	2.67	-1.48	-0.70	0.13	1.75
Q42B	Clear understanding of detailing process	55.4	0.52	1.47	-2.33	-1.04	-0.15	1.75
Q42C	Detailer responds in a timely manner	48.3	0.82	3.33	-1.54	-0.93	0.05	1.23
Q42D	Detailer is an advocate for my needs/desires	35.5	0.91	5.34	-1.23	-0.65	0.35	1.42
Q42E	Detailer is receptive to resolving conflicts	38.7	0.92	5.71	-1.33	-0.79	0.28	1.44
Q42F	Satisfied with my detailer	43.7	0.93	7.39	-1.30	-0.86	0.13	1.24

Notes:
Analyses are unweighted.
Confirmatory factor model fit indices: CFI = 0.98, TLI = 0.96, and SRMR = 0.03.

Final NPS Scales

Table 25 displays the Cronbach's alphas for the final set of scales, including the seven revised scales and the 12 original scales. All but one of the scales had alphas of 0.70 or higher, indicating acceptable internal consistency for group-level comparisons. The remaining scale, the Career Development: Career Progression scale, had an alpha close to 0.70 with a value of 0.68.

The comparisons of the mean scale scores across the overall ratings items are presented in Tables 26 to 29. The comparisons for all scales were highly significant ($p < .0001$). The patterns of means fit our hypotheses. As expected, higher scale scores were found for those with greater morale, job satisfaction, ratings of Tone, and satisfaction with Navy life, supporting the construct validity of the scales.

Table 25
Cronbach alphas for final scales

Scale	Items	Alpha
Availability of Resources	Q8A-D	0.77
Morale	Q10A-P	0.90
Gender Integration	Q12A-C	0.77
Workplace Climate	Q13A-G, I	0.87
Tempo	Q19A-C	0.76
Impact on Personal Life	Q21A-C	0.81
Immediate Supervisor	Q23A-F	0.95
Overall Command Leadership	Q24A-F	0.95
Communication	Q25A-E	0.81
Job Security	Q26A-C	0.83
Fairness	Q27A-D	0.85
Navy Image	Q28A-G	0.87
Organizational Commitment	Q37A-E	0.93
Advancement/Promotion	Q38A-C	0.70
Performance Evaluations/ Fitness Reports	Q39A-G	0.84
Recognition	Q40A-B	0.79
Career Development: Career progression	Q41A-B	0.68
Career Development: Counseling/guidance	Q41C-D	0.88
Career Development	Q41A-D	0.79
Detailing	Q42A-F	0.92

Note: Analyses are unweighted

Table 26
Mean final scale scores by respondent ratings of overall morale

Scale	Overall Morale					F-statistic	p-value
	Very Low	Low	Medium	High	Very High		
Availability of Resources	2.72	3.19	3.56	4.02	4.44	368.82	<.0001
Morale	2.43	2.83	3.28	3.69	4.12	705.51	<.0001
Gender Integration	3.29	3.65	3.89	4.18	4.50	138.16	<.0001
Workplace Climate	2.90	3.33	3.77	4.20	4.57	444.04	<.0001
Tempo	3.03	3.28	3.60	3.93	4.23	135.95	<.0001
Impact on Personal Life	3.83	3.54	3.23	2.92	2.79	86.20	<.0001
Immediate Supervisor	3.01	3.41	3.80	4.23	4.58	198.02	<.0001
Overall Command Leadership	2.57	3.09	3.70	4.25	4.67	505.58	<.0001
Communication	2.64	3.05	3.44	3.82	4.19	301.19	<.0001
Job Security	2.59	3.03	3.34	3.73	4.06	149.28	<.0001
Fairness	2.32	2.66	3.01	3.37	3.65	154.60	<.0001
Navy Image	2.45	2.89	3.34	3.75	3.97	305.07	<.0001
Organizational Commitment	2.52	3.01	3.46	3.90	4.13	189.17	<.0001
Advancement/Promotion	2.70	2.87	3.22	3.52	3.79	106.34	<.0001
Performance Evaluations/Fitness Reports	3.06	3.31	3.64	3.93	4.20	152.94	<.0001
Recognition	2.51	2.89	3.35	3.77	3.92	138.27	<.0001
Career Development: Career Progression	3.08	3.34	3.66	3.90	4.12	84.75	<.0001
Career Development: Counseling/Guidance	2.27	2.71	3.11	3.57	3.88	151.33	<.0001
Detailing	2.68	2.93	3.17	3.52	3.70	95.06	<.0001

Note: Analyses are unweighted.

Table 27
Mean Final Scale Scores by Respondent Ratings of Overall Job Satisfaction

Scale	Overall Job Satisfaction					F-statistic	p-value
	Very Dissatisfied	Dissatisfied	Neither Satisfied nor Dissatisfied	Satisfied	Very Satisfied		
Availability of Resources	2.95	3.20	3.47	3.76	4.05	163.27	<.0001
Morale	2.50	2.84	3.14	3.46	3.79	385.17	<.0001
Gender Integration	3.19	3.62	3.77	4.03	4.32	130.36	<.0001
Workplace Climate	2.59	3.14	3.55	3.99	4.50	791.29	<.0001
Tempo	2.79	3.24	3.39	3.76	4.15	187.83	<.0001
Impact on Personal Life	3.98	3.68	3.40	3.09	2.72	134.78	<.0001
Immediate Supervisor	2.94	3.38	3.68	4.01	4.33	154.92	<.0001
Overall Command Leadership	2.78	3.20	3.53	3.92	4.29	224.25	<.0001
Communication	2.64	3.00	3.29	3.61	3.96	242.52	<.0001
Job Security	2.09	2.71	3.14	3.56	4.09	364.49	<.0001
Fairness	2.04	2.52	2.89	3.20	3.54	209.43	<.0001
Navy Image	2.14	2.74	3.08	3.55	3.98	509.35	<.0001
Organizational Commitment	2.05	2.86	3.13	3.68	4.21	372.76	<.0001
Advancement/Promotion	2.57	2.86	2.98	3.34	3.76	140.85	<.0001
Performance Evaluations/Fitness Reports	3.02	3.23	3.41	3.77	4.15	206.07	<.0001
Recognition	2.41	2.78	3.09	3.52	4.00	182.80	<.0001
Career Development: Career Progression	2.77	3.26	3.41	3.77	4.18	169.68	<.0001
Career Development: Counseling/Guidance	2.08	2.61	2.94	3.32	3.75	165.71	<.0001
Detailing	2.56	2.87	2.99	3.34	3.68	122.91	<.0001

Note: Analyses are unweighted.

Table 28
Mean Final Scale Scores by Respondent Ratings of Navy Tone

Scale	Navy Tone					F-statistic	p-value
	Very Low	Low	Medium	High	Very High		
Availability of Resources	2.92	3.24	3.64	3.92	4.29	145.73	<.0001
Morale	2.59	2.95	3.31	3.63	4.05	275.40	<.0001
Gender Integration	3.34	3.67	3.91	4.16	4.51	87.77	<.0001
Workplace Climate	2.84	3.38	3.84	4.13	4.55	255.73	<.0001
Tempo	2.91	3.35	3.63	3.89	4.31	99.22	<.0001
Impact on Personal Life	4.01	3.65	3.20	2.89	2.67	104.20	<.0001
Immediate Supervisor	3.04	3.51	3.89	4.12	4.48	93.57	<.0001
Overall Command Leadership	2.98	3.33	3.75	4.08	4.55	140.33	<.0001
Communication	2.55	2.99	3.46	3.84	4.39	297.92	<.0001
Job Security	2.19	2.74	3.35	3.88	4.53	338.03	<.0001
Fairness	1.95	0.35	2.98	3.55	4.27	445.84	<.0001
Navy Image	2.05	2.61	3.35	3.89	4.38	684.24	<.0001
Organizational Commitment	2.06	2.82	3.50	3.95	4.49	306.81	<.0001
Advancement/Promotion	2.58	2.67	3.19	3.65	4.16	203.22	<.0001
Performance Evaluations/Fitness Reports	3.06	3.28	3.65	3.94	4.35	140.51	<.0001
Recognition	2.44	2.82	3.38	3.74	4.20	133.52	<.0001
Career Development: Career Progression	2.92	3.25	3.65	3.94	4.43	123.24	<.0001
Career Development: Counseling/Guidance	2.23	2.64	3.18	3.51	4.10	130.26	<.0001
Detailing	2.52	2.78	3.22	3.53	4.00	137.06	<.0001

Note: Analyses are unweighted.

Table 29
Mean Final Scale Scores by Respondent Ratings of Overall Satisfaction with Navy Life

Scale	Overall Satisfaction with Navy Life					F-statistic	p-value
	Very Dissatisfied	Dissatisfied	Neither Satisfied nor Dissatisfied	Satisfied	Very Satisfied		
Availability of Resources	2.88	3.22	3.49	3.73	4.07	135.25	<.0001
Morale	2.45	2.87	3.17	3.43	3.78	285.91	<.0001
Gender Integration	3.08	3.57	3.74	4.04	4.28	115.73	<.0001
Workplace Climate	2.58	3.18	3.58	3.96	4.45	488.67	<.0001
Tempo	2.53	3.10	3.38	3.75	4.28	259.49	<.0001
Impact on Personal Life	4.30	3.91	3.48	3.08	2.52	252.27	<.0001
Immediate Supervisor	3.01	3.41	3.70	3.96	4.33	109.36	<.0001
Overall Command Leadership	2.89	3.23	3.56	3.88	4.30	169.23	<.0001
Communication	2.62	2.96	3.29	3.58	4.01	223.13	<.0001
Job Security	2.01	2.60	3.03	3.56	4.18	391.17	<.0001
Fairness	1.93	2.38	2.81	3.16	3.74	290.82	<.0001
Navy Image	1.82	2.56	2.98	3.56	4.12	788.07	<.0001
Organizational Commitment	1.63	2.56	2.95	3.73	4.43	711.63	<.0001
Advancement/Promotion	2.44	2.69	2.94	3.33	3.93	212.74	<.0001
Performance Evaluations/Fitness Reports	2.88	3.17	3.39	3.76	4.23	230.86	<.0001
Recognition	2.20	2.71	3.03	3.51	4.09	208.82	<.0001
Career Development: Career Progression	2.58	3.12	3.35	3.79	4.26	222.23	<.0001
Career Development: Counseling/Guidance	2.12	2.57	2.90	3.31	3.75	138.85	<.0001
Detailing	2.43	2.69	2.94	3.32	3.86	194.30	<.0001

Note: Analyses are unweighted.

Navy Climate Index (NCI)

After establishing a set of reliable and valid scales, a subset of these scales was used to develop an overall measure of Navy Climate. This construct has previously been described as “Navy Tone” but Climate describes the construct in a more familiar fashion because it can be thought of as a single metric that captures the Navy’s overall “temperature” or “climate.” As shown in Figure 99, Navy Climate was conceptualized as including seven underlying constructs measured by the NPS: (1) workplace climate, (2) organizational commitment, (3) morale, (4) job security, (5) communication, (6) fairness, and (7) Navy image. The factor structure of the Navy Climate Index was tested using a higher-order confirmatory factor analysis and assessed its construct validity by conducing analyses of variance to compare NCI scores by items on the NPS which asks respondents’ to rate overall Navy Tone (i.e., Climate).

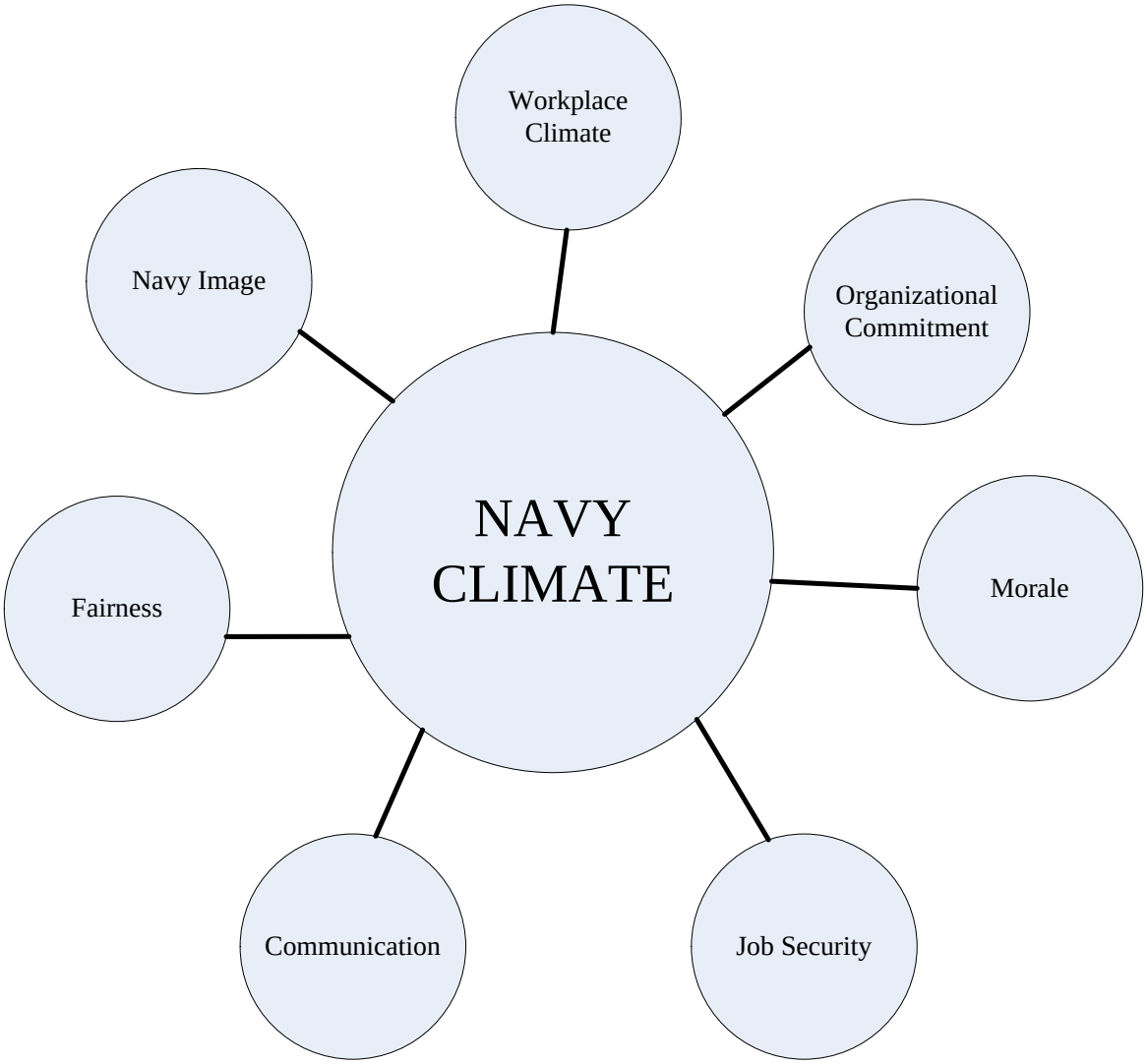

Figure 99. Constructs comprising Navy Climate Index.

Development of the Navy Climate Index

To test the conceptual model of Navy Climate shown in Figure 99, a second-order confirmatory factor model was conducted using the items and scales corresponding to each of the constructs underlying Navy Climate. Figure 100 presents a path diagram for the second-order confirmatory factor model. In this model, the following were tested: (a) if the relevant items load on each of the scales (Workplace Climate, Organizational Commitment, Morale, Job Security, Communication, Fairness, and Navy Image) and (b) if these items form a single construct representing overall Navy Climate. As shown in the figure, correlated errors are permitted between two pairs of scales: (a) Workplace Climate and Fairness, and (b) Navy Image and Organizational Commitment.

The fit indices suggest that the model has an acceptable fit, indicating that the seven scales may be combined into an overall Navy Climate Index (CFI = 0.91, TLI = 0.91, SRMR = 0.06). Table 30 presents the factor loadings. With the exception of Organizational Commitment, the scales have similar loadings with values of approximately 0.80.

The factor loadings for the scales were used to compute scores for the NCI. Weights were computed for each scale based on the scale's factor loading divided by the sum of the factor loadings. Specifically, Climate index scores were computed using the following formula where scale scores are the mean of the corresponding items:

Climate = 25*((0.15*Morale + 0.15*Workplace Climate + 0.14*Communication
+ 0.15*Job Security + 0.15*Fairness + 0.14*Navy Image
+ 0.12*Organizational Commitment)-1)

Index scores range from 0 to 100 with higher values indicating a more positive Navy climate.

Table 31 presents mean NCI by demographic characteristics. Significantly higher NCI scores were found for those who are male, have a higher education, are married, have children under age 21 in their household, are an officer or warrant officer, are not in their first term of service, and not currently deployed.

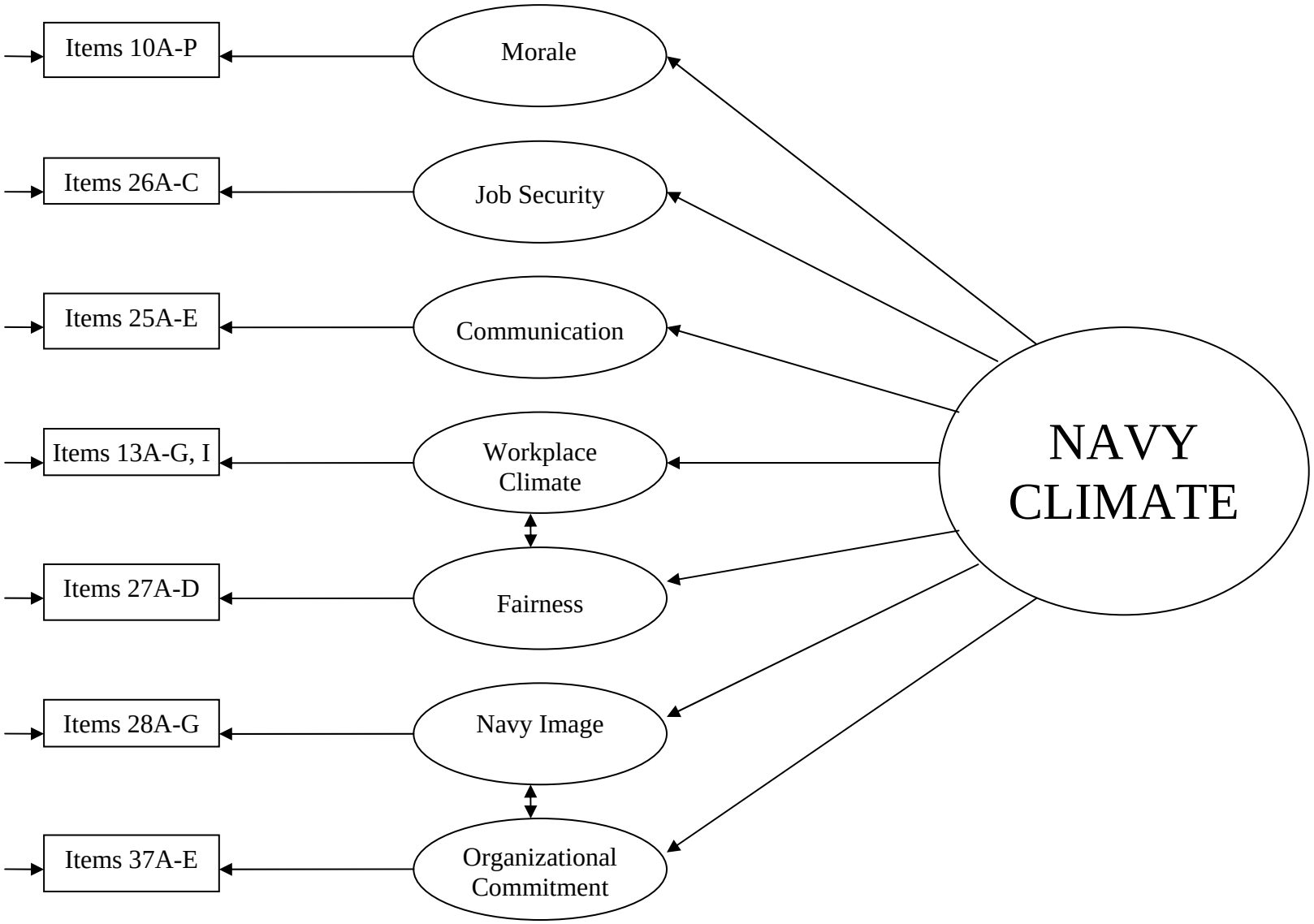

Figure 100. Path diagram for second-order confirmatory factor model of Navy Climate Index.

Table 30
Results of second-order confirmatory factor model for Navy Climate Index

Path	Standardized Coefficient
Scales	
Morale	
Q10A	0.53
Q10B	0.60
Q10C	0.53
Q10D	0.62
Q10E	0.58
Q10F	0.60
Q10G	0.59
Q10H	0.68
Q10I	0.62
Q10J	0.61
Q10K	0.59
Q10L	0.54
Q10M	0.63
Q10N	0.48
Q10O	0.50
Q10P	0.59
Workplace Climate	
Q13A	0.65
Q13B	0.72
Q13C	0.76
Q13D	0.81
Q13E	0.80
Q13F	0.55
Q13G	0.50
Q13I	0.56
Communication	
Q25A	0.56
Q25B	0.69
Q25C	0.69
Q25D	0.78
Q25E	0.65
Job Security	
Q26A	0.83
Q26B	0.70
Q26C	0.72

Table 30
Results of second-order confirmatory factor model for Navy Climate Index

Path	Standardized Coefficient
Fairness	
Q27A	0.75
Q27B	0.77
Q27C	0.81
Q27D	0.77
Navy Image	
Q28A	0.90
Q28B	0.89
Q28C	0.92
Q28D	0.50
Q28E	0.50
Q28F	0.65
Q28G	0.51
Organizational Commitment	
Q37A	0.83
Q37B	0.89
Q37C	0.88
Q37D	0.75
Q37E	0.92
Navy Climate Index	
Morale	0.81
Workplace Climate	0.82
Communication	0.80
Job Security	0.85
Fairness	0.83
Navy Image	0.79
Organizational Commitment	0.66
Model Fit Indices	
Comparative Fit Index	0.91
Tucker-Lewis Index	0.91
Standardized Root Mean Square Residual	0.06

Table 31
Mean Navy Climate Index scores by demographic characteristics

Characteristic	Mean (SD)	p
Gender		< .0001
Male	61.8 (16.2)	
Female	58.1 (16.8)	
Education		< .0001
High school or less	59.1 (17.5)	
Some college or 2-year degree	60.4 (16.8)	
Bachelor's degree or more	63.3 (14.9)	
Marital Status		< .0001
Married	63.3 (15.7)	
Not married	57.8 (16.8)	
Children under 21 Living in Household		< .0001
Yes	62.9 (15.9)	
No	59.3 (16.7)	
Pay Grade		< .0001
Enlisted	59.9 (17.1)	
Warrant Officer	65.8 (13.2)	
Officer	63.5 (14.5)	
First Enlistment or Term of Service in Navy		< .0001
Yes	56.3 (17.1)	
No	64.4 (15.0)	
Currently on deployment		.0007
Yes	57.9 (18.1)	
No	61.4 (16.2)	

Validation of Navy Climate Index

The NPS includes the following two items which ask survey respondents for their ratings of tone which is defined in the survey as "Tone is an overall measure of how Sailors feel about the Navy."

- Q29A: How would you rate Navy tone?
- Q29B: How would you rate your current command's tone?

Each item includes five response categories from 1 (very high) to 5 (very low). To assess the construct validity of the NCI, NCI scores by respondents' ratings on these two items were compared. As shown in Figures 101 and102, index scores increase with more positive respondent ratings of Navy tone and their current command's tone ($p < .0001$).

In addition, it was hypothesized that NCI scores would be positively related to the following item on job satisfaction

- Q65: Considering everything, how satisfied are you with Navy life?

As expected, scores on the NCI increased with greater satisfaction with Navy life ($p < .0001$; see Figure 103).

Finally, relationship between NCI scores and three items measuring retention intentions was evaluated:

- Q36A: I plan to serve out my current term of service or obligation.
- Q36B: I plan to reenlist or continue with my career in the Navy at my next decision point.
- Q36C: I plan to stay in the Navy for a full career if possible.

While the mean NCI scores varied significantly across all three retention intention items ($p < .0001$), the pattern of means in the figures suggests that the relationship is not as strong for item Q36A (intentions to serve out current term of service or obligation) as the other two items (see Figures 104 to 106). Perhaps this is due to the reduced amount of choice and alternatives involved in serving out current obligations in comparison to making choices at future decision points.

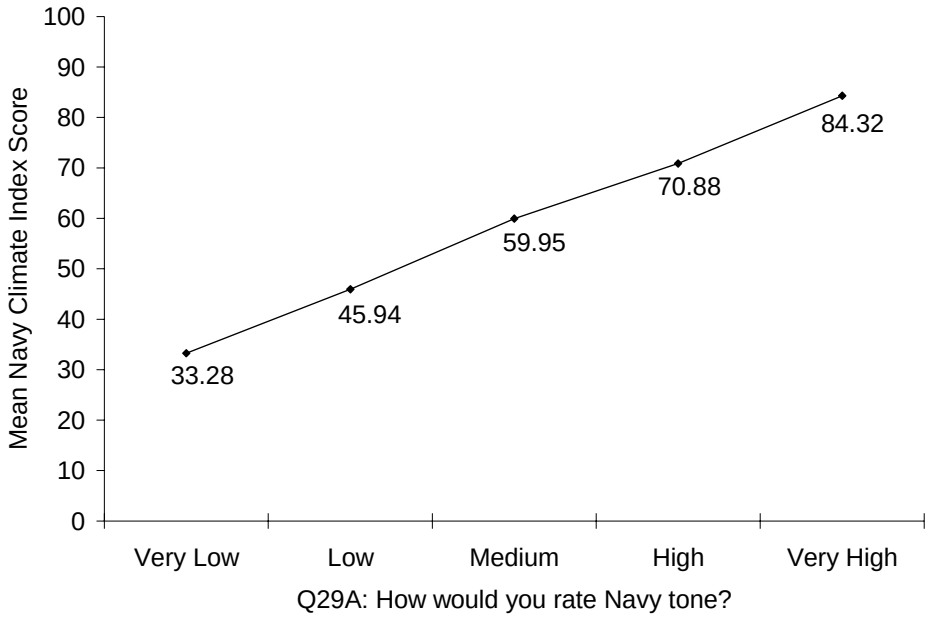

Figure 101. Mean Navy Climate Index scores by respondent ratings of Navy tone.

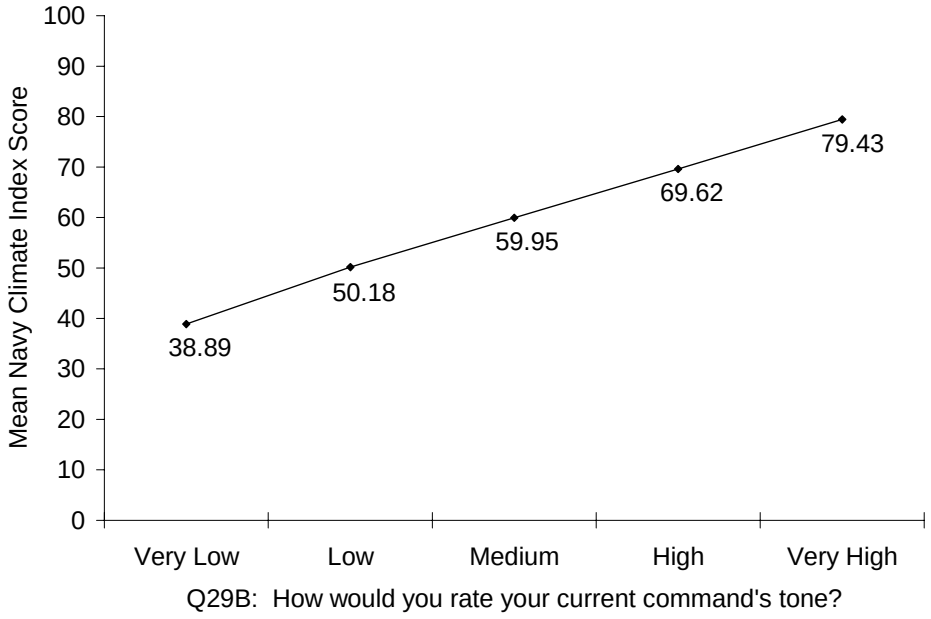

Figure 102. Mean Navy Climate Index scores by respondent ratings of command's tone.

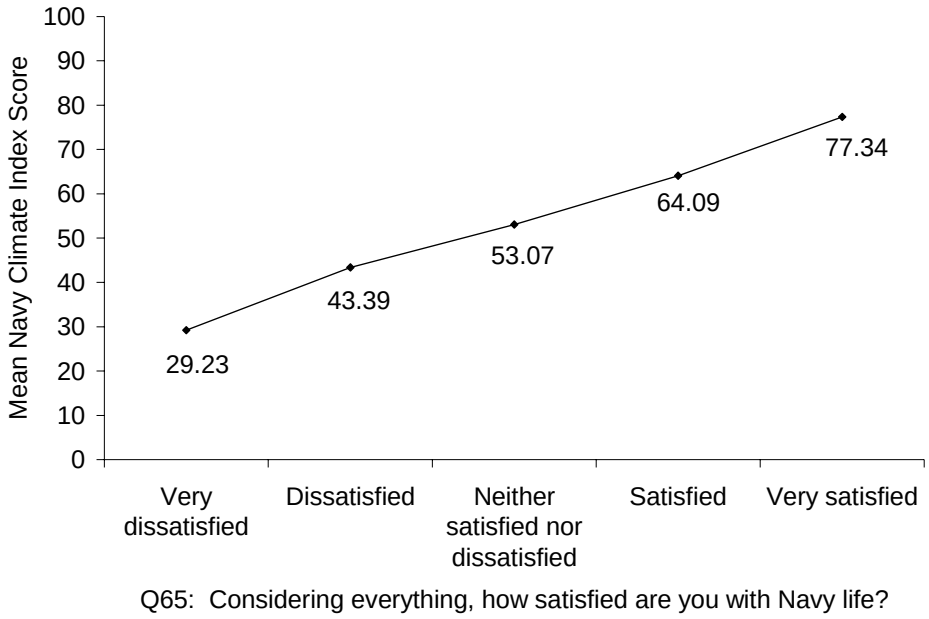

Figure 103. Mean Navy Climate Index scores by respondent ratings of satisfaction with Navy life.

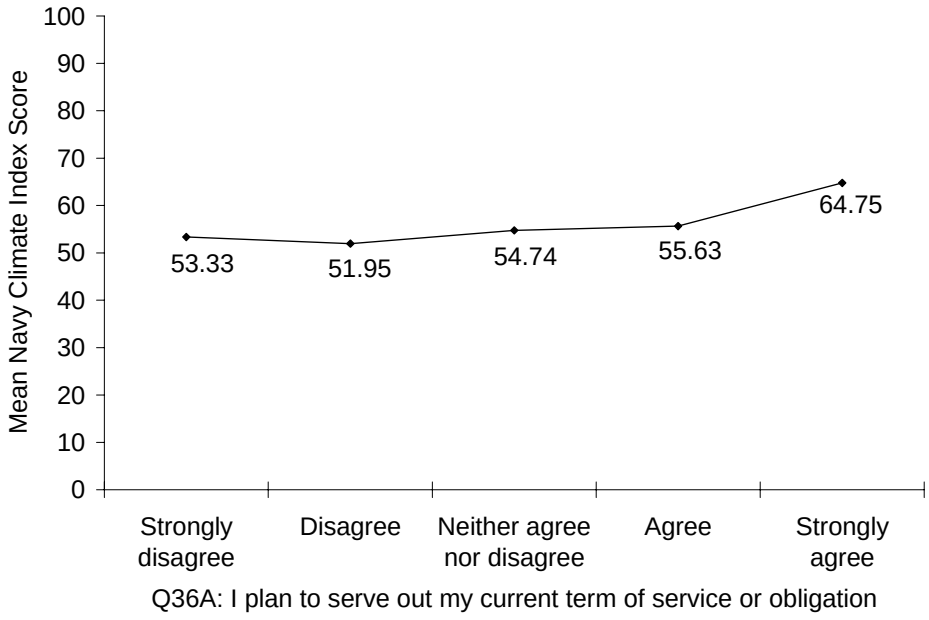

Figure 104. Mean Navy Climate Index scores by retention intentions: Plans to serve out current term of service or obligation.

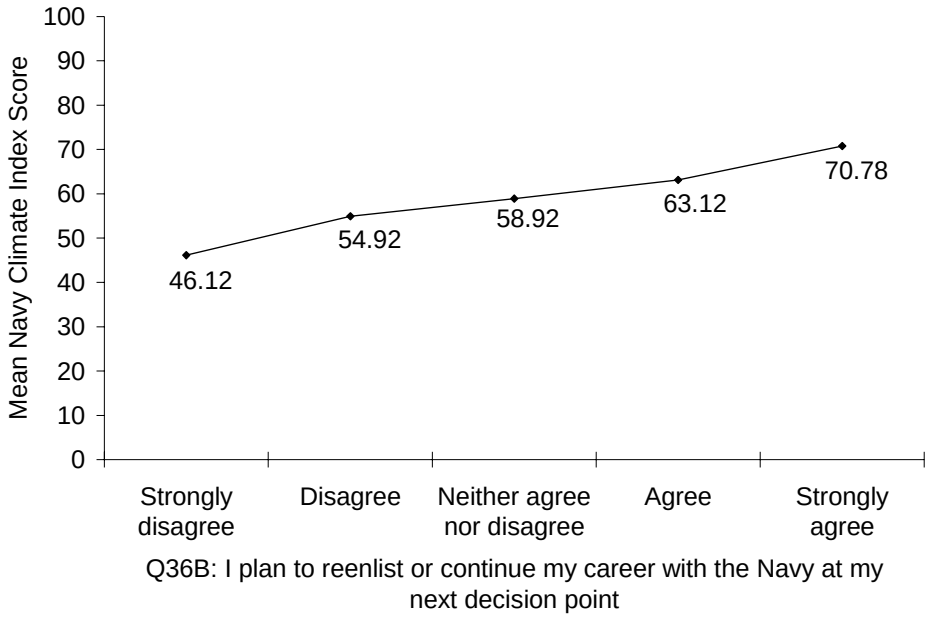

Figure 105. Mean Navy Climate Index scores by retention intentions: Plans to reenlist or continue career with Navy at next decision point.

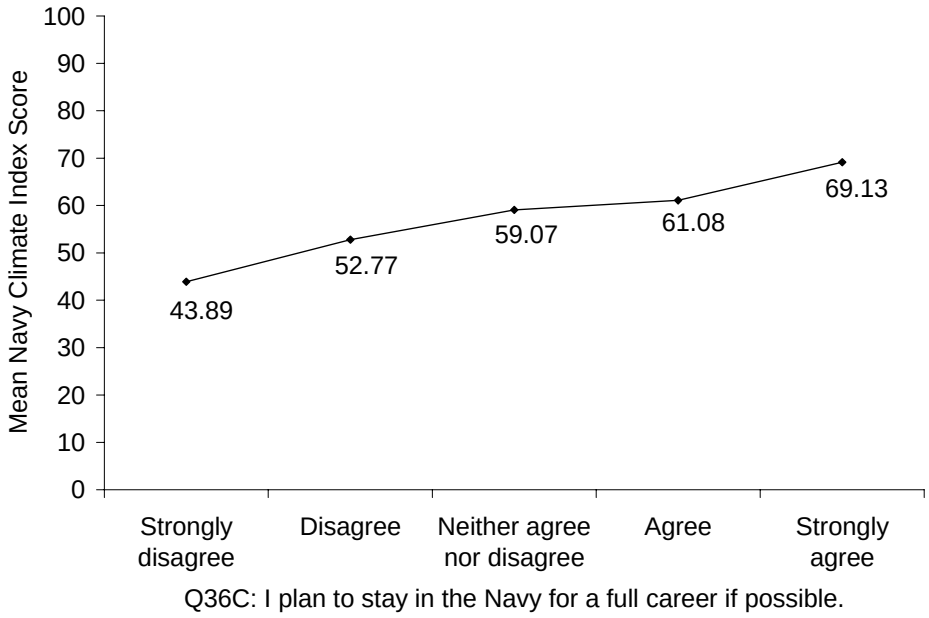

Figure 106. Mean Navy Climate Index scores by retention intentions: Plans to stay in Navy for a full career.

Re-Enlistment/Continuation Intention Index

The items, scales, and NCI described in previous chapters provide comprehensive and useful information concerning Sailor perceptions of Navy life. However, in some cases it may not be feasible to administer all 101 items comprising the 18 NPS scales or even the 48 items included in the NCI. Therefore, a smaller subset of items was explored to determine if those items may provide useful information concerning Sailor perceptions of Navy life when circumstances do not permit the inclusion of the larger set of items. One of the primary outcomes related to perceptions of Navy life is a Sailor's intentions to re-enlist (enlisted) or continue (officers) in the Navy at their next decision point. In this chapter, an index of a sub-set of NPS items was developed to predict re-enlistment/continuation intentions

Re-Enlistment/Continuation Intention Index for All Sailors

A cross-validation approach was used for developing and validating the re-enlistment/continuation approach. Specifically, the sample of 3,610 participants was randomly divided into two halves with 1,805 participants each. The first half of the sample was used to develop the index and second half of the sample was used to validate the index. In the remainder of this chapter, these two halves of the sample are referred to as the development sample and the validation sample.

Using data from the development sample, the responses to item Q36B (I plan to re-enlist or continue my career with the Navy at my next decision point) were collapsed into 2 categories: intend to re-enlist/continue (agree or strongly agree) and does not intend to re-enlist/continue (disagree, strongly disagree, or neither agree nor disagree). All 101 items from the original NPS scales were entered into a backward stepwise logistic regression as possible predictors of re-enlistment/continuation intentions. Items on overall ratings of morale, tone, job satisfaction, and satisfaction with Navy life and several demographics and job-related variables, including gender, martial status, education level, presence of children under age 21 in household, and pay grade (enlisted, warrant officer, officer) were also included.

The criterion for a predictor to remain in the model was a p-value of 0.10 or less. To avoid the elimination of cases due to the list wise deletion method used for missing values in the backwards stepwise regression procedure, missing values were recoded to the mid-point for each scale for these analyses. In other words, a missing value for items from the Morale scale would be recoded to the category of "no effect."

The logistic regression results for this model are shown in Table 32. Based on the results of the logistic regression analyses, a scoring algorithm for the re-enlistment/ continuation intention index was created, which involves multiplying the items by their regression coefficients and summing them. The formula for calculating the re-enlistment/continuation intention index is

Retention = (-**0.3054***enlisted)+(**0.2527***children)+(-**0.6366***firstsrv)+

(-**0.1542***Q8C)+(-**0.1211***Q10B)+(**0.1910***Q10L)+(**0.1710***Q10P)+

(-**0.2994***Q19B)+(- **0.1240***Q21A)+(**0.6609***Q26A)+(**0.3555***Q26D)+

(-**0.2137***Q26F)+(**0.2522***Q28C)+(**0.1900***Q37A)+(-**0.1372***Q37B)+

(-**0.1438***Q37C)+(**0.1831***Q37D)+(-**0.1347***Q38A)+(**0.3557***Q65);

After computing the index scores, receiver operating characteristic (ROC) curve analyses was then conducted (Hsiao, Bartko & Potter, 1989; Swets, 1995) to identify a cut point for the scores which could be used to identify which Navy personnel are likely to re-enlist/continue. ROC analyses provide information about the ability of the index to correctly classify personnel into those who intend to re-enlist/continue and those who do not. The proportion of people who intend to re-enlist/continue who are correctly classified as intending to re-enlist/continue based on the index (i.e., sensitivity) and the proportion of people who do not intend to re-enlist/continue and are correctly classified as such based on the index (i.e., specificity) are calculated for various cut points of the index. These values are then used to compute an ROC curve which plots sensitivity versus 1 minus specificity (i.e., true positive proportion versus false positive proportion) for the possible cut points of the test. The area under the ROC curve measures the overall accuracy of the index. An area of 1.0 indicates the most accurate index possible whereas an area of 0.5 reflects accuracy no greater than chance.

Based on the ROC analyses, a cutoff (i.e., cut) score for each index was selected that maximized sensitivity after achieving a specificity level of at least 0.7. The positive predictive power (PPP) and negative predictive power (NPP) was then computed at the selected cut score. The PPP represents the percentage of Sailors who are classified as intending to re-enlist/continue based on the index cut score who do in fact intend to re-enlist/continue. Conversely, the NPP indicates the percentage of Sailors who do not meet the cut score who do not intend to re-enlist/continue.

Table 33 presents the areas under the ROC curve, the cut scores, and corresponding statistics for the re-enlistment/continuation intention index. As shown in the table, the index performed moderately well with an area under the ROC curve (AUC) of 0.82, sensitivity of 0.78, and specificity of 0.71.

To validate the re-enlistment/continuation intention index, the scoring algorithms were applied and cut points identified using the development sample to the validation sample. As shown in Table 33, slightly lower values were found for this sample: AUC = 0.79, sensitivity = 0.74, and specificity = 0.68.

Term-Specific Re-Enlistment/Continuation Intention Index

In the regression model for all Sailors described above, whether or not a Sailor was in his or her first term of service was a highly significant predictor of re-enlistment/continuation intentions ($p < .0001$). Given these results, further analyses were conducted to explore whether predictors of re-enlistment/continuation intention

may vary according to whether a Sailor is in his or her first term of service. Therefore, separate models for those in their first term or service versus those in later terms of service were conducted (Question 32).

Tables 34 and 35 present the final logistic regression model for Sailors by their term of service based on the developmental sample. Using the regression coefficients from the two models, a scoring algorithm for the re-enlistment/continuation intention index by term of service was computed. The formula for calculating the re-enlistment/continuation intention index for Sailors in their first term of service is:

Retention = (-**0.70***enlisted)+(-**0.42***Q19B)+(**0.26***Q19C)+(-**0.53***Q21a)+
(**0.37***Q24c)+(**0.65***Q24d)+(-**0.73***Q24f)+(**0.85***Q26a)+
(**0.45***Q26d)+(-**0.50***Q26f)+(**0.33***Q37a)+(-**0.48***Q37b)+
(**0.39***Q37d)+(-**0.21***Q38a)+(**0.50***Q65);

Similarly, the re-enlistment/continuation intention index scores for Sailors in a later term of service may be calculated as follows:

Retention = (-**0.23***Q8c)+(**0.22***Q10l)+(**0.23***Q10p)+(-**0.18***Q13e)+
(-**0.21***Q19b)+(**0.15***Q24e)+(-**0.31***Q25c)+(**0.46***Q26a)+
(**0.27***Q26d)+(**0.34***Q28c)+(-**0.22***Q38a)+(**0.38***Q38d)+
(**0.33***Q65);

Table 36 presents the areas under the ROC curve, the cut scores, and corresponding statistics for the re-enlistment/continuation intention index. As shown in the table, the index performed very well at predicting re-enlistment/continuation intentions for Sailors in their first term of service with an area under the ROC curve (AUC) of 0.87, sensitivity of 0.86, and specificity of 0.70. The index was slightly less able to predict re-enlistment/continuation intentions for those in later terms of service with AUC of 0.78, sensitivity of 0.74, and specificity of 0.70. The values were very similar for the validation sample, supporting the generalizability of the findings. The area under the ROC curve for the index among first-term Sailors in the validation sample was 0.84 and among later-term Sailors was 0.74.

Table 32
Logistic regression model predicting re-enlistment/continuation intention among all Sailors: Development sample

Variable	B	SE	OR	95% CI	p
Enlisted	-0.33	0.13	0.72	0.56, 0.93	.0108
Have children	0.29	0.13	1.33	1.03, 1.72	.0268
First term of service	-0.87	0.15	0.42	0.31, 0.56	< .0001
Q8C: Adequate spare parts and supplies	-0.18	0.06	0.84	0.75, 0.94	.0027
Q10B: Performance evaluation system	-0.15	0.07	0.87	0.76, 0.99	.0316
Q10L: Pay, bonuses, other compensation	0.21	0.07	1.23	1.08, 1.40	.0017
Q10P: Performance of the crew on exercises	0.21	0.08	1.23	1.05, 1.43	.0085
Q19B: Time spent on shore duty	-0.29	0.06	0.75	0.66, 0.85	< .0001
Q21A: Career gets in way of personal life	-0.15	0.06	0.86	0.77, 0.97	.0127
Q26A: Feel positive about future Navy career	0.55	0.07	1.74	1.51, 1.99	< .0001
Q26D: Willing to change rating/designator to stay in Navy	0.35	0.05	1.41	1.29, 1.54	< .0001
Q26F: Concerned future policy changes will hurt job	-0.20	0.06	0.82	0.73, 0.92	.0005
Q28C: Would recommend the Navy as a good place to work	0.26	0.08	1.29	1.10, 1.52	.0022
Q37A: Navy has personal meaning for me	0.22	0.10	1.24	1.03, 1.50	.0229
Q37B: Feel like I'm part of the family in the Navy	-0.16	0.09	0.85	0.71, 1.02	.0744
Q37C: Feel emotionally attached to the Navy	-0.16	0.09	0.86	0.71, 1.02	.0879
Q37D: Could not easily become attached to another organization	0.22	0.07	1.24	1.03, 1.50	.0017
Q38A: Clear understanding of advancement/promotion system	-0.17	0.07	0.85	0.74, 0.97	.0143
Q38D: Expect to be promoted within current term of service	0.34	0.05	1.40	1.27, 1.56	< .0001
Q65: Considering everything, how satisfied are you with Navy life?	0.34	0.09	1.40	1.17, 1.69	.0003

Table 33
ROC analysis results for re-enlistment/continuation intentions among all Sailors

Statistic	Development Sample	Validation Sample
Area under ROC curve	0.82	0.79
Cut-off score	3.30	3.30
Sensitivity	0.78	0.74
Specificity	0.71	0.68
Positive predictive value	0.73	0.71
Negative predictive value	0.76	0.71

Table 34
Logistic regression model predicting re-enlistment/continuation intention among Sailors in first term of service: development sample

Variable	B	SE	OR	95% CI	p
Enlisted	-0.70	0.27	0.50	0.29, 0.84	.0091
Q19B: Time spent on shore duty	-0.42	0.12	0.66	0.52. 0.83	.0003
Q19C: Time spent on sea duty	0.26	0.12	1.30	1.03, 1.65	.0301
Q21A: Career gets in way of personal life	-0.53	0.11	0.59	0.48, 0.72	< .0001
Q24C: Deals well with superiors	0.37	0.18	1.45	1.01, 2.08	.0434
Q24D: Provides adequate support and guidance	0.65	0.20	1.92	1.31, 2.83	.0009
Q24F: Satisfied with command leadership	-0.73	0.20	0.48	0.33, 0.71	.0002
Q26A: Feel positive about future Navy career	0.85	0.12	2.33	1.83, 2.96	< .0001
Q26D: Willing to change rating/designator to stay in Navy	0.45	0.08	1.57	1.34, 1.83	< .0001
Q26F: Concerned future policy changes will hurt job	-0.50	0.11	0.61	0.49, 0.76	< .0001
Q37A: Navy has personal meaning for me	0.33	0.15	1.39	1.03, 1.87	.0293
Q37B: I feel like I'm part of the family in the Navy	-0.48	0.14	0.62	0.47, 0.82	.0008
Q37D: I could not easily become attached to another organization	0.39	0.12	1.48	1.16, 1.89	.0017
Q38A: Clear understanding of advancement/promotion system	-0.21	0.12	0.81	0.64, 1.03	.0794
Q65: Considering everything, how satisfied are you with Navy life?	0.50	0.15	1.65	1.22, 2.23	.0011

Table 35
Logistic regression model predicting re-enlistment/continuation intention among Sailors in later term of service: development sample

Variable	B	SE	OR	95% CI	p
Q8C: Adequate spare parts and/or supplies	-0.23	0.07	0.79	0.69, 0.91	.0011
Q10L: Pay, bonuses, other compensation	0.22	0.08	1.24	1.05, 1.47	.0097
Q10P: Performance of the crew, work team, or ship on exercises	0.23	0.10	1.26	1.03, 1.53	.0224
Q13E: Feeling of accomplishment I get from doing my job	-0.18	0.08	0.83	0.71, 0.97	.0205
Q19B: Time spent on shore duty	-0.21	0.08	0.81	0.70, 0.95	.0070
Q24E: Responsive to Sailor needs and concerns	0.15	0.09	1.16	0.97, 1.39	.0971
Q25C: Command leadership communicates positive attitude about Navy	-0.31	0.11	0.74	0.59, 0.92	.0062
Q26A: I feel positive about my future Navy career	0.46	0.09	1.58	1.33, 1.87	< .0001
Q26D: I would be willing to change my rating/designator if it was the only way I could stay in the Navy	0.27	0.06	1.31	1.17, 1.46	< .0001
Q28C: I would recommend the Navy as a good place to work	0.34	0.10	1.40	1.15, 1.72	.0010
Q38A: I have a clear understanding of the present Navy advancement/promotion system	-0.22	0.09	0.80	0.68, 0.95	.0117
Q38D: I expect to be advanced/promoted within my current term of service, commitment, or obligated service	0.38	0.06	1.47	1.30, 1.65	< .0001
Q65: Considering everything, how satisfied are you with Navy life?	0.33	0.12	1.39	1.10, 1.75	.0053

Table 36
ROC analysis results for re-enlistment/continuation intentions by term of service

Statistic	First Term of Service		Later Term of Service	
	Development Sample	Validation Sample	Development Sample	Validation Sample
Area under ROC curve	0.87	0.84	0.78	0.74
Cut-off score	2.54	2.54	3.95	3.95
Sensitivity	0.86	0.84	0.74	0.70
Specificity	0.70	0.72	0.70	0.64
Positive predictive value	0.61	0.65	0.79	0.75
Negative predictive value	0.91	0.88	0.63	0.58

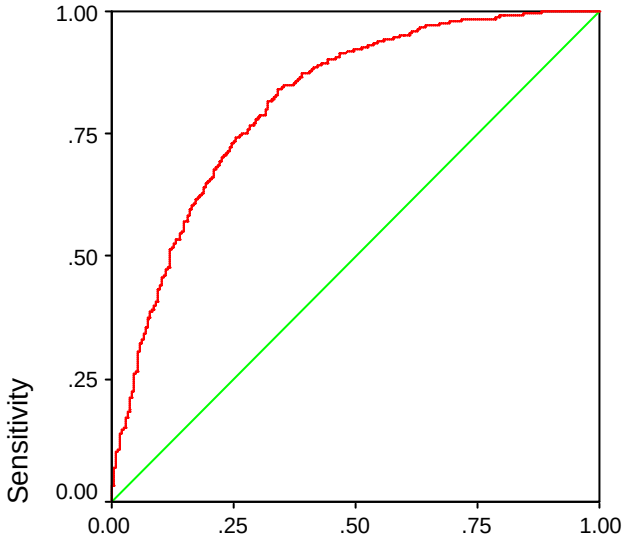

Figure 107. ROC curve for Retention Index among all Sailors: Development sample.

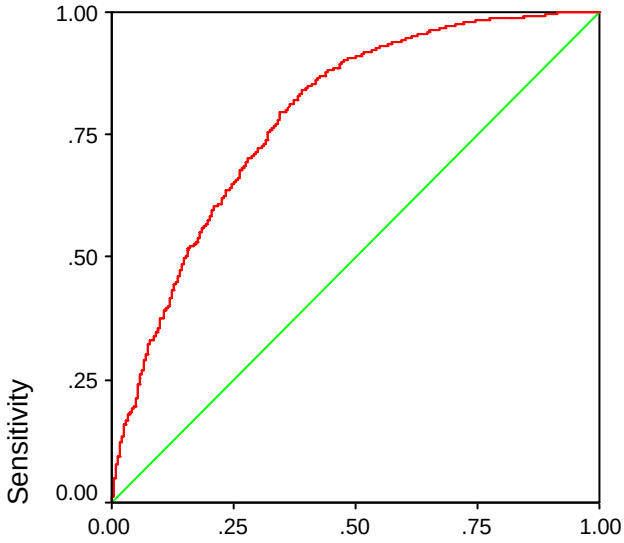

Figure 108. ROC curve for Retention Index among all Sailors: Validation Sample.

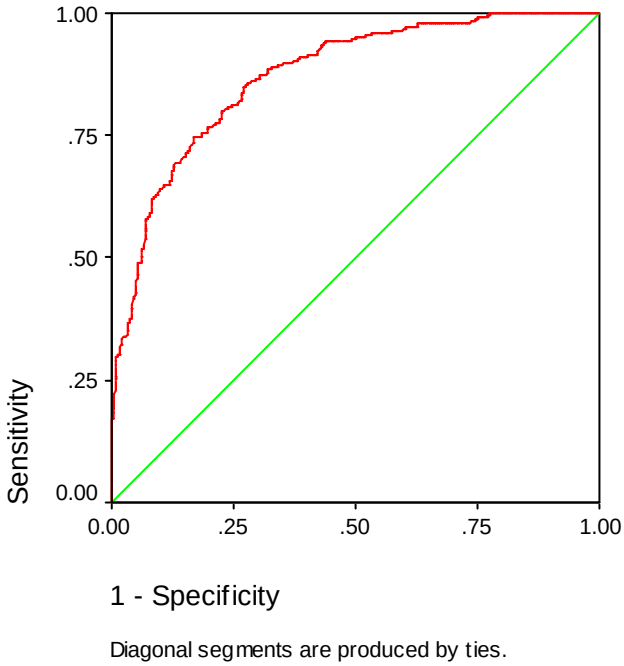

Figure 109. ROC curve for Retention Index among Sailors in first term of service: Development Sample.

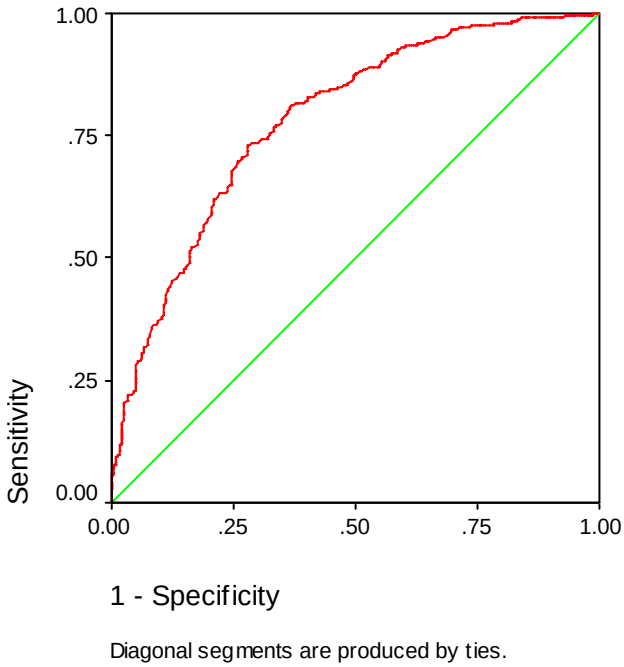

Figure 110. ROC curve for Retention Index among Sailors in later term of service: Development Sample.

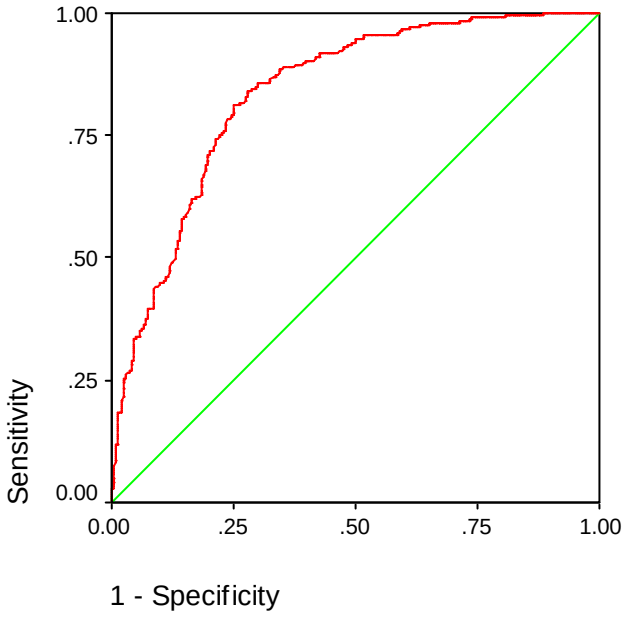

Figure 111. ROC curve for Retention Index among Sailors in first term of service: Validation Sample.

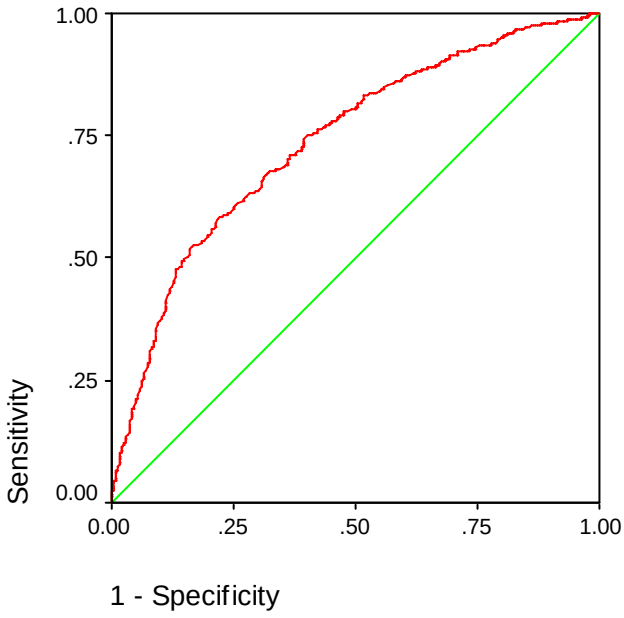

Figure 112. ROC curve for Retention Index among Sailors in later term of service: Validation Sample.

Conclusion and Discussion

This report describes our psychometric evaluation of existing items and scales on the 2005 NPS. Overall, the psychometric analyses suggest that most of the scales performed very well, demonstrating good internal consistency and construct validity. The vast majority of items had high levels of discrimination and a spread of threshold parameters.

However, the results suggested potential improvements to six of the scales. Based on the item and scale analyses, as well as item content, it is recommend that items be removed from the Workplace Climate, Communication, Job Security, Advancement/Promotion, and Detailing scales. In addition, it is recommended that the Career Development scale be divided into two scales measuring Career Progression and Counseling or Guidance. The analyses suggest that these changes will improve the psychometric properties of the scales on future administrations of the survey.

An additional goal of the current investigation was to develop an index measuring overall Navy Climate. The Navy Climate Index (NCI) was developed and included the following seven scales from the NPS: (1) workplace climate, (2) organizational commitment, (3) morale, (4) job security, (5) communication, (6) fairness, and (7) Navy image. A second-order confirmatory factor analysis verified the factorial validity of the NCI. Scores on the NCI were strongly related to respondents' ratings of Navy tone, their current command's tone, and overall satisfaction with Navy life, supporting the construct validity of the index. Demographic comparisons suggested that the following factors were associated with more positive perceptions of Navy Climate: male, higher education, married, children under age 21 in household, officer or warrant officer, not in first term of service, and not currently deployed. The NCI was significantly related to intentions to re-enlist (or continue) and to stay in the Navy for a full career.

Next, an index for predicting intentions to re-enlist or continue at the next decision point was developed. A cross-validation approach was utilized wherein the NPS sample was randomly split in half and the index was developed on one half and validated on the other. The index was developed using backwards stepwise logistic regression to identify items and demographic and job characteristics which predicted reenlistment or continuation intentions. The results suggested that models predicting reenlistment or continuation intentions separately for Sailors in their first term of service and those in later terms of service were more accurate than a model developed for all Sailors combined. Cut points for the reenlistment or continuation intention index were identified using ROC analysis. The index had an overall sensitivity of 0.85 and specificity of 0.71 for Sailors in their first term of service when the full sample was used. Values for Sailors in later terms of service were somewhat lower with sensitivity = 0.72 and specificity = 0.67.

A limitation of our study was that only data on retention intentions rather than actual retention behavior was available. Very few respondents are likely to have made retention decisions during the short time frame of the study, preventing us from using retention behaviors as a criterion for developing the index. The reenlistment or continuation intention index developed in this study will need to be tested as a predictor

of the actual behavior of Sailors when given the choice of re-enlisting or continuing their careers. Work currently being conducted at NPRST with prior year NPS data suggests that reenlistment or continuation intentions are solid predictors of subsequent reenlistment or continuation behaviors. This administration of the NPS will be combined with others surveys that ask about career intentions so that they can be followed-up across time to assess the strength of the relationship between career intentions and actual behavior.

Future Directions

The scales that were developed and validated in this study (Navy Climate Index and Reenlistment or Continuation Intention Index) provide useful tools for assessing Sailors' perceptions of their Navy careers. Future research should further enhance the usability of these scales. In particular, the number of items on the scales and indices could potentially be reduced further by eliminating similar or redundant items. For example, the Rasch partial-credit model, a type of IRT model, could be used to identify items that have similar threshold parameters. If a scale contains two items with the same threshold parameters, one item could be removed with minimal or no loss of information.

An alternative approach to scale reduction is to explore the suitability of individual items as proxies for scales. For example, the NPS includes an item that asks respondents to rate the overall morale of their present command. It is possible that this item could be used as a proxy for the entire 16-item morale scale. Regression analyses could be conducted to determine the amount of variance in scores on the morale scale that is accounted for by the global morale item, allowing us to quantify the potential loss of information by using a single-item.

It is important to note that reducing the number of items on scales may also reduce the reliability or validity of the scales. However, in some circumstances, shorter scales may provide benefits, such as lower respondent burden and/or reduced time and costs for survey administration, which may outweigh some loss in reliability or validity. For example, a short NCI could be administered as part of a Navy Quick Poll to provide more frequent statistics on current Navy climate, allowing leaders to rapidly identify concerns and make changes. A shortened index could also be adapted for future use with the Navy Reserve Component as well as the Navy civilian workforce allowing a Total Force Climate Index that would assess satisfaction and related work and Navy life outcomes.

Future work should utilize psychometric methods to establish the significance of changes in index scores in terms of important, practical outcomes, such as reenlistment or continuation intentions. These methods would associate a specific increase in the value of the index to a change in a particular outcome. For example, methods have been utilized in health-related quality of life research to establish what is referred to as a minimally clinically important difference (MCID) for a quality of life scale. An MCID has been defined as the "smallest difference in scores in the domain of interest which patients perceive as beneficial and which would mandate, in the absence of troublesome side effects and excessive cost, a change in the patient's management" (Jaeschke, Singer, & Guyatt, 1989).

While not directly transferable, the MCID terminology is conceptually similar to the NCI and the statistical techniques can be used to identify what change in NCI scores is associated with a change in retention intentions (i.e., changing from intending to leave the Navy to intending to continue). For example, an anchor-based approach to determining MCID may be used to determine the average change in NCI scores corresponding with an increase from “agree” to “strongly agree” on item Q36B (I plan to reenlist or continue with my career in the Navy at my next decision point). Future studies should also explore the relationship between NCI scores and outcomes from data sources external to the NPS, such as performance measures, advancements/promotions, or test (Armed Services Vocational Aptitude Battery or ASVAB) and training scores.

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